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Economic Aspects of the Sheep Industry

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ECONOMIC ASPECTS OF THE SHEEP INDUSTRY*

EDWIN C. VOORHIES¹ AND W. E. SCHNEIDER²

FOREWORD

This bulletin represents the results of a study undertaken at the request of various sheep interests of California. The primary object has been to analyze the chief statistical data relating to the sheep industry. Those interested in specific topics are asked to consult the table of contents (p. 2). For those who wish to obtain quickly the conclusions set forth in the body of the publication, the summary found in the first few pages will be helpful.

ACKNOWLEDGMENTS

Various organizations connected with the livestock, meat, and wool industries assisted in supplying information upon which this bulletin is based. Among them may be included various local and national meat packers, common carriers entering the state, livestock buyers, local and national wool-trade associations, officers of the various branch offices of the Livestock, Meats and Wool Division, United States Department of Agriculture, and numerous growers of sheep and lambs.

Especial thanks are given to the Secretary of the California Wool Growers Association, W. P. Wing, and its members, for their cooperation in the collection of much of the basic data appearing in this publication. Valuable suggestions and important contributions have been made by Associate Professor Robert F. Miller and Assistant Professor J. F. Wilson, of the Division of Animal Husbandry, College of Agriculture, University of California. Much of the information with reference to the movement of sheep to and from the ranges has been furnished by Dr. J. P. Iverson, Chief, Division of Animal Industry,

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California State Department of Agriculture. W. W. Wofford, in charge of the Federal-State Livestock Market News Service at Los Angeles, assisted in compiling seven-year records of the mid-western and eastern movement of live and dressed lambs.³ Mention should be made of the calculations made by George H. Garner, senior student in the College of Agriculture of the University of California.

SUMMARY

Lamb or mutton and wool come out of the same production process,⁴ and although it is impossible to separate completely the products in any discussion of sheep husbandry, for purposes of convenience portions of the discussion in this publication will necessarily center around (1) lamb and mutton, and (2) wool.

California cannot be detached from either the United States or the world in any consideration of the sheep industry. Conditions outside of the state boundaries profoundly affect the two major products of the sheep industry. On the one hand the state is dependent on outside markets to take its surplus of lambs during the spring of the year, and on the other hand the United States must import almost as much wool from abroad as is produced at home. An appreciable amount of this consists of carpet wools, not produced in the United States. The latter enter free of duty.

The number of sheep in the United States has been increasing since January 1, 1922. The percentage increase during the last seven years has been 32.7 per cent (trend value; actual increase 30.4 per cent). On January 1, 1929, estimates indicated more sheep on farms and ranges than at any time in the eighteen preceding years. The industry is still on the upward swing of the production cycle. With production more on a lamb basis than formerly, favorable weather conditions in any one year might result in a marked increase in the lamb crop, and this in turn would bring about heavy marketings. This condition would be further aggravated should producers stop retaining ewe lambs for further expansion and marginal producers begin to liquidate flocks.

³ See: Schneider, W. E., and W. W. Wofford. The California spring lamb industry (*mimeo.*). Federal-State Market News Service. 1925.

⁴ "Enterprises that stand in the relationship to each other of using the same raw materials, like the coke and gas enterprises of a gas plant, or of coming part of the way at least out of the same production process, like wool and mutton from sheep, are said to be joint-product enterprises." (Black, J. D. Production economics. p. 205. Henry Holt and Co., New York, 1926.)

The trends of sheep population in California and the western states have also been upward since 1922. The increase in the state has been greater than in any other section of the country, being 53.9 per cent (trend value, actual increase 55.5 per cent)—almost twice as great as that for the nation. The present rate of growth in both the nation and state cannot long continue without unfavorable results. While the human population of the United States increases at the approximate rate of $1\frac{1}{2}$ per cent a year, that of sheep has forged ahead for the past seven years at the rate of 4 per cent a year. Since 1922, California's sheep population has gained approximately 8 per cent yearly. A substantial increment in sheep production will be required over a series of years to keep pace with the growth in human population, even without an increase in the per-capita consumption of mutton and lamb. The present rate of increase, however, cannot continue without unfavorable effects on the industry.

Increases in sheep numbers in the west have undoubtedly taken place largely at the expense of the cattle population. With the marked advance in cattle values during 1927 and 1928 further shifts from cattle to sheep can scarcely be expected.

Lamb prices have failed to show the recession which has usually characterized expansion in the past. Beginning with 1923 and including 1929, California lamb producers have enjoyed 7 years of relatively high prices. These prices were brought about by several conditions, among which the most important are (1) the increased demand for lamb and (2) the improvement in the quality of lamb offered.

While it is impossible to determine just when prices will be high or low during a given year, it is true that over a period of years they average higher in the spring than during the other seasons. The majority of the growers in the interior valleys of the state have been able to ship a relatively large proportion of their lambs during this season. The production of spring lambs should be attempted only in favored parts of such sections.

Prices and purchasing power for slaughter sheep during the past few years have been relatively lower than for slaughter lambs. There has been a widening of the spread between the market values of sheep and of lambs, with the result that the industry is largely on a ewe and lamb basis in most sections of the country. It is highly probable that this differential in values will continue.

Although data on the consumption of lamb and mutton are to a certain extent based on estimates, there can be but little doubt that

there has been over a period of years (1900–1928) a downward trend in the per-capita consumption. In view of the declining per-capita consumption of food stuffs in general the problem of increasing lamb consumption is a difficult one. The production of high-quality lamb, the greater utilization of the forequarter, and intensive extension work by the industry in demonstrating the use of lamb in the diet offer possibilities in raising the level of consumption. This is especially the case in the central and southern sections of the country where the per-capita consumption is very low.

The lamb producer of California in the areas of heaviest production is fortunate in being able to place his product on the markets of the middle west and the Atlantic states at a time of the year when prices are relatively high. Up to the present the larger local supplies during the spring have not induced a decrease in price during that period because the surplus has been shipped east, where the demand for it has been strong. The removal of this surplus must be continued. It would be advantageous if the rate of increase in the production of spring lambs could be slackened somewhat. Considerable competition develops during certain years between fed lambs, largely from Colorado and Nebraska, and the early lambs of this state. Early lambs originate in large numbers in Arizona, Idaho, Kentucky, the Virginias, Tennessee, and Missouri.

The demand for high-quality lambs during the fall and winter months has led to the establishment of both public and private feeding yards in this and other states for the purpose of supplying local demand. In addition to securing higher quality, this may also have a favorable effect on regulating the supply of lambs for the market. The furnishing of a regular, even supply of lambs to the markets of the country would assist in stabilizing prices.

During the latter part of 1927 beef prices began to rise and continued to do so during 1928 and 1929. The higher prices for beef will undoubtedly react favorably on the prices of lamb. Hog prices have been rising since the latter part of 1928. With an increase in the poultry population of the country the outlook is for lower poultry prices. Lamb will perhaps have less of an advantage in relation to poultry meat because of this situation.

It is not sound for novices to enter the sheep business at the high prices now prevailing, in the expectation that the present favorable level of prices for lambs will continue indefinitely. During periods of remunerative prices there is always the temptation to overstock.

Sheepmen should be urged to put their businesses on a sound financial footing. It is probable that the purchasing power of sheep may decline during the next three or four years.

Except for a brief period after the war, imports and exports of lamb and mutton have been comparatively negligible. With improvements in quality of imports and transportation, together with continued favorable prices in this country, imports of lamb are a possibility.

Since the disastrous slump after the war, wool prices held at fairly high levels until the latter part of 1928. Barring unforeseen technical changes in the production of textiles, the long-time outlook for wool appears to be favorable. There is but little room for the expansion of the world's wool supply under present conditions. Much of it is produced under hazardous conditions, the weather of any particular year affecting the number of sheep and the production of wool. Temporary variations in production may affect prices in much the same way as high and low yields of wheat affect the prices of that product, but these conditions do not fundamentally affect shifts in production. It must be remembered, however, that wool prices may be influenced by factors which cannot be measured statistically.

The tariff has a decided effect on domestic wool prices. At the present time wool production in the United States supplies about one-half of the domestic needs. If the tariff remains unchanged, continued favorable prices may be expected for several years. The change in price will eventually depend upon whether world production or consumption increases more rapidly.

There was a sharp decline in both domestic and foreign wool prices during the first six months of 1929. The 1928-29 world wool production was considerably (6%) larger than that of 1927-28. Indications point to a 1929-30 crop of approximately the same size as that of 1928-29. Further material decline in wool prices seems unlikely. Some recovery may take place before the end of 1929. Indications point to a good world demand during the next few months. The present wool outlook does not seem to be one to encourage further expansion in wool production at the present time.

DEVELOPMENT OF THE SHEEP INDUSTRY

United States.—The discoverers and early explorers of North America found no domesticated sheep. Early settlers brought sheep from their respective countries; Spanish sheep were introduced in Mexico, English into Virginia and Massachusetts, and Dutch into New York. While sheep have been bred in this country for more than three hundred years,⁵ improved breeds were not introduced until the early part of the nineteenth century, with the exception of isolated cases of partially improved animals.

The interruption of commerce during the War for Independence gave a temporary impetus to the keeping of sheep, and the Embargo Act of December, 1807, the Non-Intercourse Act of 1809, and the War of 1812, gave occasion for large advances in sheep raising and woolen manufactures. Until the period 1830–1837, sheep were usually kept as an adjunct to general farming, although increase in the demands of woolen mills for raw material led many farmers to specialize in wool production.

The first census figures relative to sheep are those for 1840, which indicate that sheep raising had developed to the greatest degree in Vermont and western New York. For the past hundred years a westward movement of sheep has been in progress. Between 1845 and 1855 eastern sheepmen began to give their attention to the production of mutton as well as wool. The change to the mutton type was most rapid near the cities. Dairying replaced sheep raising to a considerable degree in the older sections even before the Civil War.

At the close of the Civil War the return of cotton and the government supplies of wool on hand caused a crisis in the sheep industry. In the regions remote from market—the Southwest and Far West—sheep raising continued to be one of the most profitable enterprises. With the opening up of grazing lands in the west after 1870, there was a rapid expansion of the sheep industry into the west south central, the mountain, and the Pacific states. Nearly 52 per cent of the sheep recorded in 1880 were in sections west of the Mississippi. In numbers of sheep the year 1884 marks one of the high points for the United States.

⁵ Sheep were brought to Jamestown in 1609. (Hayes, John L. Sheep husbandry in the United States. Senate Extra Document 25:1–133. 1880.)

The year 1900 was another high point in the sheep industry of the country. While other sections either remained stationary or receded in sheep numbers, the mountain states made phenomenal gains in the decade previous to 1900. The section east of the Mississippi River and the Pacific Coast states actually declined in sheep population. Ohio, which had held the lead (except for 1880, when California ranked first) was now passed by three western states: Montana, Wyoming, and New Mexico. In 1900, over 55 per cent of the country's sheep population was in the mountain and Pacific states.

Few changes occurred in the distribution of the sheep population of the United States during the period 1900-1910, a decrease taking place in all sections of the country except in the mountain states, where sheep numbers continued to forge ahead until about 1912.

The decrease between 1910 and 1920 (table 1) was marked except in the west central section of the country and on the Pacific Coast. The mountain states showed the greatest proportionate loss.

The relative distribution of sheep in the country has changed but little during recent years except in the west south central states (Texas, Arkansas, Oklahoma, and Louisiana). This latter division has increased in numbers while all of the other divisions have either declined or remained stationary.

In table 1 will be found the census data for sheep, excluding lambs. These enumerations are not strictly comparable because the time of reporting is not the same for all years used. In compiling this table 1860, 1870, 1880, 1890, and 1900 refer to June 1; 1910 to April 15; 1920 and 1925 to January 1. It is obvious, for example, that the 1910 data are not comparable to those for 1920 and 1925, for large numbers of sheep undoubtedly were sent to market between January 1 and April 15. The importance of collecting data on the same date in years of census enumeration cannot be too strongly emphasized.

Furthermore, on account of the developments within the industry, such as the tendency toward lamb production giving a ewe and lamb basis for the industry, comparisons between data of census years must be used with considerable caution. The data in tables 1 and 2 do, however, give indications of the development of the industry in different sections of the country.

California.—Sheep were brought into California by the Spanish in 1770.⁶ By 1800, the mission books accounted for 88,000 sheep in the

⁶ Hittell, Theodore H. *History of California*, 1:333. Pacific Press Publishing House and Occidental Publishing House, San Francisco. 1885.

TABLE 1
NUMBER OF SHEEP (EXCLUDING LAMBS) ON FARMS, 1860-1925
(Thousands, i.e., 000 omitted)

Division and state	1860	1870	1880	1890	1900	1910	1920	1925
United States.....	22,471*	28,478	42,192	40,876	39,853	39,644	26,108	26,410
Geographic Divisions:								
New England.....	1,780	1,450	1,362	937	563	306	192	122
Middle Atlantic.....	4,385	4,096	3,609	3,196	1,970	1,260	835	679
East North Central.....	6,912	11,165	10,566	9,450	6,900	6,535	3,732	3,272
West North Central.....	1,230	2,474	3,097	2,882	3,156	3,525	3,370	2,616
South Atlantic.....	2,541	2,110	2,579	2,445	1,706	1,553	1,027	918
East South Central.....	2,435	2,238	2,308	2,316	1,490	1,514	1,123	1,019
West South Central.....	1,137	994	4,089	4,710	1,839	1,662	2,204	2,519
Mountain.....	868	821	7,097	9,520	17,984	19,510	9,918	11,128
Montana.....		2	279	2,353	4,215	4,960	1,574	1,668
Idaho.....		1	117	358	1,965	2,110	1,910	1,466
Wyoming.....		6	450	713	3,327	4,827	1,483	1,993
Colorado.....		121	1,091	897	1,353	1,306	969	846
New Mexico.....	830	619	3,939	2,474	3,334	2,895	1,265	1,388
Arizona.....		1	467	515	668	917	763	950
Utah.....	37	59	523	1,937	2,553	1,671	1,284	1,920
Nevada.....		11	231	273	568	825	671	898
Pacific.....	1,184	3,130	7,484	5,419	4,244	3,779	3,706	4,118
Washington.....	10	44	389	265	558	295	472	425
Oregon.....	86	318	1,368	1,780	1,961	1,958	1,451	1,361
California.....	1,088*	2,768	5,727	3,373	1,725	1,525	1,784	2,332

* Including unenumerated ranch sheep, the figure for the United States would be 23,975,000; California 1,111,000.

Sources of data: 1860, 1870, 1880, 1890, U. S. Dept. Com., Bur. of the Census. Fourteenth census of the U. S. 5:586. 1922. 1900, 1910, U. S. Dept. Com., Bur. of the Census. Thirteenth census of the U. S. 5: 407. 1913. 1925, Dept. Com., Bur. of the Census U. S. Census of Agr. 1925: 28-37. 1927.

TABLE 2
PERCENTAGE DISTRIBUTION OF SHEEP ON FARMS, 1860-1925

Division and state	1860	1870	1880	1890	1900	1910	1920	1925
United States.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Geographic divisions:								
New England.....	7.92	5.09	3.23	2.29	1.41	0.77	0.74	0.46
Middle Atlantic.....	19.51	14.38	8.55	7.82	4.94	3.18	3.20	2.57
East North Central.....	30.76	39.21	25.04	23.12	17.31	16.48	14.29	12.39
West North Central.....	5.47	8.69	7.34	7.05	7.92	8.89	12.91	9.91
South Atlantic.....	11.31	7.41	6.11	5.98	4.28	3.92	3.93	3.48
East South Central.....	10.84	7.86	5.47	5.67	3.74	3.82	4.30	3.86
West South Central.....	5.06	3.49	9.69	11.52	4.61	4.19	8.44	9.54
Mountain.....	3.86	2.88	16.82	23.29	45.13	49.21	37.99	42.14
Montana.....		0.007	0.66	5.76	10.58	12.51	6.03	6.32
Idaho.....		0.003	0.28	0.88	4.93	5.32	7.32	5.55
Wyoming.....		0.021	1.07	1.74	8.35	12.18	5.68	7.55
Colorado.....		0.42	2.59	2.19	3.39	3.29	3.71	3.20
New Mexico.....	3.69	2.17	9.34	6.05	8.37	7.30	4.85	5.26
Arizona.....		0.003	1.11	1.26	1.68	2.31	2.92	3.60
Utah.....	0.16	0.21	1.24	4.74	6.41	4.22	4.92	7.27
Nevada.....		0.04	0.55	0.67	1.43	2.08	2.57	3.40
Pacific.....	5.27	10.99	17.74	13.26	10.65	9.53	14.19	15.59
Washington.....	0.04	0.15	0.92	0.65	1.40	0.74	1.81	1.61
Oregon.....	0.38	1.12	3.24	4.36	4.92	4.94	5.56	5.15
California.....	4.84	9.72	13.57	8.25	4.33	3.85	6.83	8.83

Sources of data: Computations by authors based upon table 1.

state. This number grew rapidly, until in 1834 there were some 321,500 sheep, swine, and goats under the control of the missions.⁷ After the secularization of the missions the number steadily diminished until in 1842 there were only 31,600 sheep, swine, and goats in California. The first census after the admission of the state to the United States gave returns of less than 15,000 sheep, most of which were in Los Angeles, Santa Barbara, Monterey, and Sacramento counties. After the American occupation numbers grew rapidly and in 1852 assessors' data reported 82,867 sheep.⁸

Wool production was the primary object of the early California industry. This was developed on a Merino foundation and large bands of three and even four-year-old wethers were kept solely for the wool clip.

TABLE 3
PERCENTAGE DISTRIBUTION OF SHEEP IN CALIFORNIA, 1860-1925

Section	1860	1870	1880	1890	1900	1910	1920	1925
North coast	7.42	5.28	13.31	19.44	16.62	12.93	10.93	11.02
South coast	36.50	22.38	9.82	5.47	3.73	7.14	3.91	4.09
Sacramento Valley	29.44	26.79	21.24	25.12	29.18	42.82	36.70	43.15
San Joaquin Valley	9.82	25.50	29.55	34.22	31.69	15.42	29.42	31.02
Southern California	16.47	17.03	18.64	12.71	8.64	9.01	6.39	3.04
Mountain	34	3.03	2.44	3.04	10.13	12.68	12.60	7.68

Source of data: Computations by authors based upon census returns.

Between 1850 and 1884, the sheep population of the state expanded rapidly, California in 1880 claiming the largest sheep population in the Union. Following this, a gradual decline took place which continued, with fluctuations, until 1900.

In 1860, the census showed the sheep population to be concentrated in the south coast counties, the Sacramento Valley, and southern California. The San Joaquin Valley and the north coast section each claimed less than 10 per cent of the total number, while that of the mountain counties was negligible. Shifts were pronounced during the next sixty years (table 3). The Sacramento Valley section has continued to hold an important place. There has been a gradual movement toward concentration of sheep in this section and the San Joaquin Valley.

⁷ Dept. of the Interior. Report on cattle, sheep and swine supplementary to enumeration of livestock on farms in 1880. U. S. Dept. Interior Report on the Productions of Agriculture. p. 75. Government Printing Office, Washington, D.C. 1883.

⁸ California State Agricultural Society. Number of other livestock. Transactions 1859:344-345. Sacramento. 1860.

While sheep in both the north coast and mountain counties increased in relative importance prior to 1900, since the latter date there has not been a distinct trend in either section. An important factor in the relative importance of sheep in the north coast section

SHEEP IN THE UNITED STATES, JANUARY 1, 1929

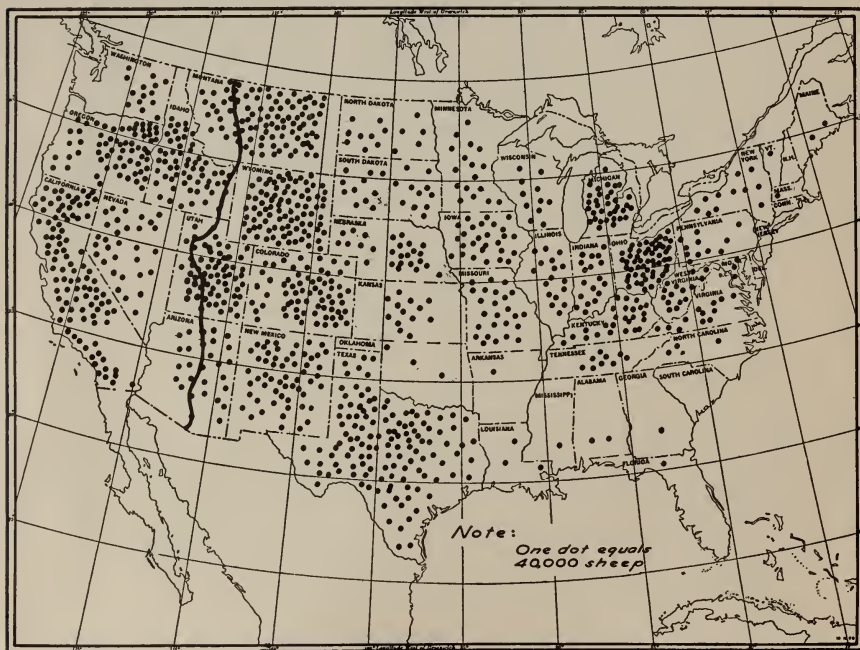


Fig. 1.—By far the larger number of sheep are found west of the Mississippi River and in Ohio, Kentucky, and southern Michigan. It should be noted that the centers of sheep and wool production are far from the centers of consumption. Both lamb and wool are largely consumed in the north Atlantic states. The line crossing Montana, Idaho, Utah, and Arizona is the "break" line for wool shipments. East of the line wool can be shipped to Boston by direct rail cheaper than by rail and water (1928). West of the line the rail and water rate to Boston via Pacific Coast and ports is cheaper than by direct rail. 1 dot = 40,000 sheep. (Data on population from table 4. Data on break line furnished by California Wool Growers Association.)

today compared with the period 1880–1900 has been the coyote. Many of the north coast ranges are better adapted to sheep than to cattle production. Originally this was a sheep territory, but the coyotes drove the sheepmen out of business. Cattle came in, occupying many of the ranges. More recently the coyote problem has been abated by the Biological Survey, State Department of Agriculture and various counties cooperating, and the swing is back to sheep.

The south coast counties declined in relative importance from 1860 to 1900 and have not played a major rôle in the industry since 1880.

The development of alfalfa and dairying has been largely responsible for these shifts. The rapid settlement of southern California during the past twenty years caused the sheep population to decline, and with the exception of Imperial Valley, this section is unimportant. Sheep have been constantly forced back. Today the range industry utilizes 'bad lands'—low foothills, which are good for nothing but stock raising. This is especially true when these areas can be utilized with the summer mountain range of the national forests.

With the turn in the century came a movement to market yearlings, thus disposing of many of the three and four-year-old wethers kept primarily for the growing of wool. This movement materially increased the number of ewes which could be carried on a given area. About 1915, sheepmen began to market lambs in larger numbers, partially eliminating the yearling wethers. The first recorded movement of milk lambs from California occurred in 1898. Since 1920 great impetus has been given to the production of early spring lambs. The industry in this state today is largely on an ewe and lamb basis.

SHEEP PER HUMAN INHABITANT, UNITED STATES, JANUARY 1, 1928

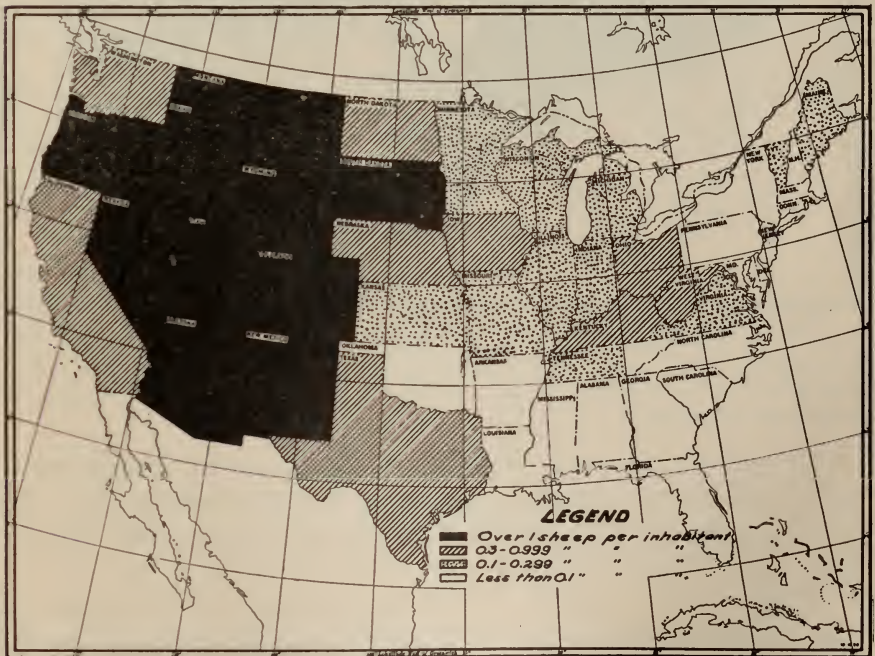


Fig. 2.—Compared with the human population, sheep are far more important in the western group of states than in other sections of the country. With a large industrial population and a high lamb consumption per capita the north Atlantic and middle Atlantic states have a small sheep population. Compare with figure 1. (Data computed by authors from table 4 and the estimated human population of each state.)

GEOGRAPHIC DISTRIBUTION OF THE SHEEP POPULATION

United States.—On January 1, 1929, the eleven western states claimed over 56 per cent of the sheep in the United States (table 5 and fig. 1). On the addition of Texas to this area the percentage is raised to nearly 67. Population exerts an influence on this distribution (fig. 2), the more sparsely settled sections generally claiming the larger sheep numbers.

DENSITY OF SHEEP POPULATION, UNITED STATES, 1929

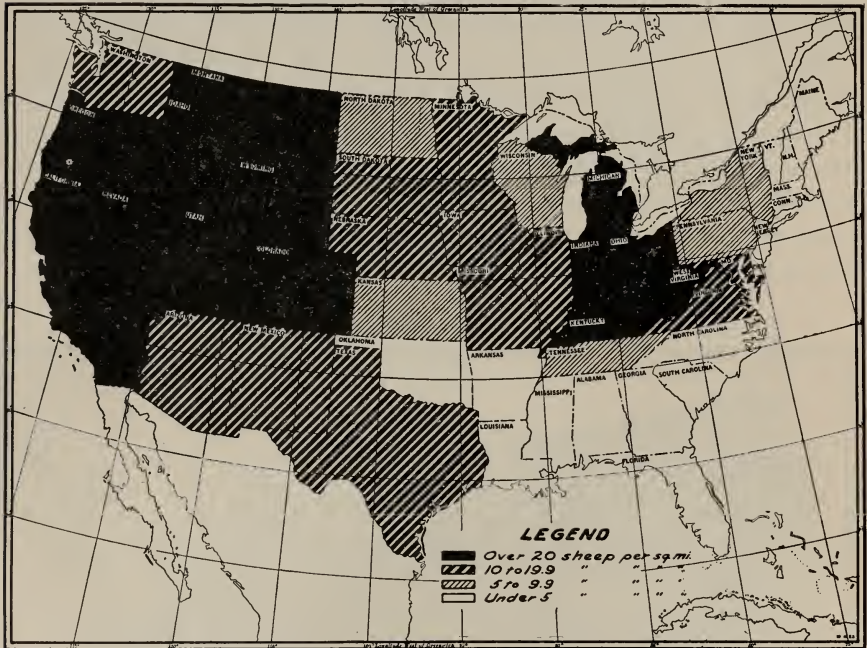


Fig. 3.—The greatest density of sheep per square mile occurs in the western states and the Ohio valley. In the South and in New England sheep are unimportant. The center of the industry in the early part of the 19th century was in the latter section. (Data computed by authors from table 4 and from land areas of states.)

Numerically the north central states are second in importance in sheep population. Sheep are somewhat generally scattered over this area, the greatest density and the largest numbers being found in Ohio and Michigan (fig. 3).

California.—On January 1, 1929, the Sacramento Valley contained approximately 41 per cent of the sheep in the state, and the San Joaquin Valley over 30 per cent (fig. 4). The north coast counties contributed about 12 per cent of the state's total. Although sheep production is of major importance relative to other agricultural enterprises in the eastern mountain counties, they contain only 8 per cent of the state's sheep (fig. 5). On account of sheep movements across

county and state lines (p. 33) during the year, numbers in these and other counties necessarily vary. The south coast counties and southern California are relatively unimportant sheep sections (fig. 6), containing 5 and 4 per cent respectively of the state's total. At times Imperial County in the latter section contains a considerable number of sheep and makes important contributions to the early lamb trade (table 46).

DISTRIBUTION OF SHEEP IN CALIFORNIA, JANUARY 1, 1929



Fig. 4.—The largest number of sheep is found in the Sacramento Valley. There is considerable concentration in the San Joaquin Valley, the north coast counties, and the northeastern counties of Modoc and Lassen. Large movements of sheep occur within the state at different times of the year. It will be noted that there is a large number reported from Imperial County, although few sheep are found within Imperial the year round. 1 dot = 6,000 sheep. (Data to authors from California State Dept. Agr.)

RECENT TRENDS IN SHEEP RAISING

Numbers of Sheep in the United States.—Census data are valuable in showing changes of a general nature, but it is difficult, if not impossible, to obtain from them information relative to trends and cycles of sheep population. Even though the basic figures of sheep population were dependable in themselves, they are inadequate for the

TABLE 4

ESTIMATED NUMBER OF SHEEP ON FARMS AND RANGES, UNITED STATES,
JANUARY 1, 1920-1929
(Thousands, i.e., 000 omitted)

Division and state	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
United States.....	40,243	38,690	36,186	36,212	36,876	38,112	39,730	41,881	44,554	47,171
North Atlantic.....	1,341	1,219	1,124	1,067	1,045	1,063	1,096	1,058	1,112	1,079
North Central.....	10,345	9,701	8,533	8,596	8,780	8,901	9,659	10,476	10,514	11,203
South Atlantic.....	1,210	1,218	1,173	1,148	1,104	1,122	1,141	1,184	1,299	1,383
South Central.....	4,453	4,673	4,582	4,393	4,729	4,903	4,952	5,605	6,265	6,784
Western.....	22,894	21,879	20,774	21,008	21,218	22,123	22,882	23,558	25,364	26,722
Montana.....	2,450	2,230	2,460	2,370	2,441	2,579	2,880	3,053	3,358	3,761
Idaho.....	2,356	2,121	2,016	2,046	1,946	1,960	1,880	1,974	2,110	2,216
Wyoming.....	3,000	2,875	2,676	2,520	2,520	2,700	2,870	3,100	3,193	3,448
Colorado.....	1,964	2,247	1,940	2,449	2,327	2,565	2,537	1,938	2,806	2,780
New Mexico.....	2,250	2,205	2,085	1,877	2,007	2,100	2,050	2,250	2,362	2,362
Arizona.....	1,350	1,310	1,245	1,243	1,181	1,164	1,220	1,230	1,132	1,109
Utah.....	2,410	2,290	2,335	2,380	2,425	2,355	2,472	2,650	2,730	2,866
Nevada.....	1,340	1,160	1,125	1,190	1,060	1,100	1,175	1,198	1,234	1,259
Washington.....	624	531	451	465	497	516	478	526	552	574
Oregon.....	2,250	2,160	1,966	1,868	1,924	2,039	2,120	2,247	2,359	2,501
California.....	2,900	2,750	2,475	2,600	2,890	3,045	3,200	3,392	3,528	3,846

Sources of data: 1920-1925, U. S. Dept. Agr. Sheep and lambs: estimated number. U. S. Dept. Agr. Crops and Markets 4: 40. 1927. 1926, *ibid.* 5: 42. 1928. 1927, 1928, 1929, *ibid.* 6: 41. 1929.

purpose of determining the trend of production. They are only inventory figures, and these without any allowances for changes in turn-over may lead to erroneous conclusions. Since 1920, estimates of year to year changes have been made by the United States Department of Agriculture (table 4).

Recently the Bureau of Agricultural Economics has tentatively revised estimates of yearly sheep population for 1900-1919. While exact data have not yet been made public, the trend as depicted in figure 7 is probably more accurate than that which can be obtained from data now published. The revised estimates have been compared

with the estimated number of fleeces shorn.⁹ Although minor discrepancies exist between the two sets of data, correlation during the past fifteen years has been high.

The general trend in sheep numbers since 1900 has been downward (fig. 7). Cycles in the sheep population since 1900 have not occurred with any great degree of regularity. An examination of the movements in population is, however, worthy of study. A peak in numbers was reached in 1902, which was followed by a decline for the

TABLE 5

PERCENTAGE DISTRIBUTION OF SHEEP ON FARMS AND RANGES, UNITED STATES,
JANUARY 1, 1920-1929

Division and state	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
North Atlantic.....	3.33	3.15	3.11	2.95	2.83	2.79	2.76	2.53	2.50	2.29
North Central.....	25.71	25.07	23.58	23.74	23.81	23.35	24.31	25.01	23.60	23.75
South Atlantic.....	3.01	3.15	3.24	3.17	2.99	2.94	2.87	2.83	2.92	2.93
South Central.....	11.07	12.08	12.66	12.13	12.82	12.86	12.46	13.38	14.06	14.38
Western.....	56.89	56.55	57.41	58.01	57.54	58.05	57.59	56.25	56.93	56.65
Montana.....	6.09	5.76	6.80	6.54	6.62	6.77	7.25	7.29	7.54	7.97
Idaho.....	5.85	5.48	5.57	5.65	5.28	5.14	4.73	4.71	4.74	4.70
Wyoming.....	7.45	7.43	7.40	6.96	6.83	7.08	7.22	7.40	7.17	7.31
Colorado.....	4.88	5.81	5.36	6.76	6.31	6.73	6.39	4.63	6.30	5.89
New Mexico.....	5.59	5.70	5.76	5.18	5.44	5.51	5.16	5.37	5.30	5.01
Arizona.....	3.35	3.39	3.44	3.43	3.20	3.05	3.07	2.94	2.54	2.35
Utah.....	5.99	5.92	6.45	6.57	6.58	6.18	6.22	6.33	6.13	6.08
Nevada.....	3.33	3.00	3.11	3.29	2.87	2.89	2.96	2.86	2.77	2.67
Washington.....	1.55	1.37	1.25	1.28	1.35	1.35	1.20	1.26	1.24	1.22
Oregon.....	5.59	5.58	5.43	5.16	5.22	5.35	5.34	5.37	5.29	5.30
California.....	7.21	7.11	6.84	7.18	7.84	7.99	8.05	8.10	7.92	8.15

Source of data: Computations by authors based upon table 4.

following three years. During the period 1905-1909 the sheep population expanded. A downward movement continued from the latter date until 1915, which was followed by a minor rise in 1919, after which a downward trend again set in, culminating in 1922. During the eight years 1922-1928 there has been a decided rise in numbers. From the data available it would appear that the length of the period from depressions to peaks in population or vice versa varies from three to six years (fig. 7). At the present time there has been an upward swing for eight years. If history repeats itself it would seem logical to expect a downward trend in population within the next two years.

⁹ Connor, Louis G. Review of the tariff on wool, by Mark A. Smith. Bul. Nat. Assn. Wool Manfrs. 56(4):449-463. 1926.

Prevention of Cyclical Movements.—Sheepmen are as much interested in avoiding the vicious influence of the cycle as are other classes of business men. In all of the animal industries it is difficult to control production on account of the large number of individual producers and the dependence of production on the forces of nature. Although the effects of the cycle in the sheep industry are not felt for so long a period of time as in the cattle industry,¹⁰ some of the movements have had disastrous results. These might have been averted if producers had been informed of conditions in the industry and had acted accordingly. High prices tend to induce increases in flocks, while low prices act in the opposite direction.

If these cyclical movements continue it will be absolutely necessary for both sheepmen already established and newcomers in the industry to accumulate a sufficient surplus during favorable price years to carry them over lean years.

Sheep Population of California.—Comparable yearly data for the number of sheep in California previous to 1900 are not available. Since the latter date the sheep industry of the state has more than held its relative place in the industry of the country. While the general trend of sheep numbers in the United States has been downward (fig. 8) during the past 28 years, the general trend has been upward in this state. An irregular cyclical movement in the sheep population of this state can be discerned (fig. 8). From 1900 to 1905 the sheep population increased, but a decline was recorded for the next three years. An expansion from 1908 to 1910 was followed by a decrease, the low point being reached in 1915. Beginning with 1916 there was a rapid acceleration in numbers for five years, followed by a sharp decrease for the next two years. Since 1922, the sheep population has been climbing rapidly, and the movement should soon be at the peak of the cycle. It is of interest to note that the length of the irregular cycle in the past has been from seven to eight years.

Generally speaking, periods of high purchasing power have been those of low sheep population. However, both purchasing power and population suffered depressions in 1922 and since this date the sheep population and purchasing power have been on the upswing (figs 8 and 16). This can be explained in part by an increase in the demand for lamb. While movements of population and purchasing power within the state do not correspond with those in the nation for 1900–1909, during the past eighteen or nineteen years the correlation has been remarkably close.

¹⁰ Voorhies, Edwin C., and A. B. Koughan. Economic aspects of the beef cattle industry. California Agr. Exp. Sta. Bul. 461:20–23. 1928.

California contains approximately one-twelfth of the sheep in the United States (8.16 per cent). Since 1922, the relative growth of the sheep population of the state has been far greater than that of the nation. Caution, however, should be exercised in expanding the sheep

RELATIVE IMPORTANCE OF MAIN SHEEP COUNTIES, CALIFORNIA, JANUARY 1, 1929

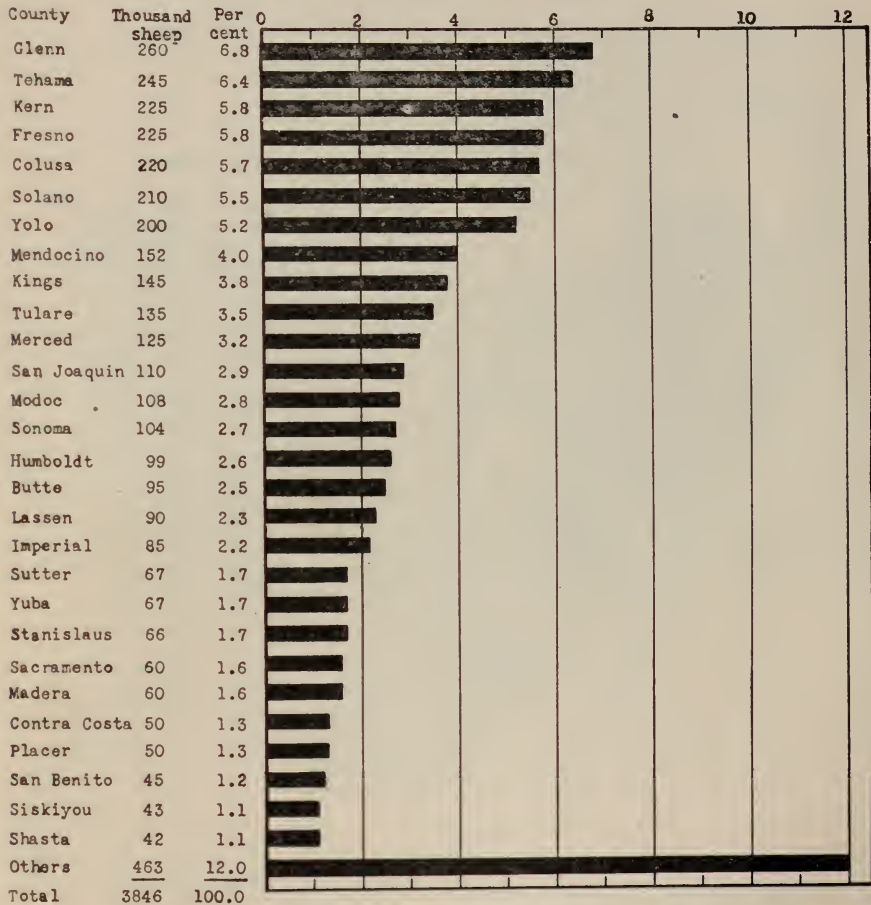


Fig. 5.—The principal sheep counties of the state are located in northern and central California. It should be noted that the counties which have the largest numbers of sheep are not always those producing the largest numbers of spring lambs for the markets (compare with fig. 26). (Data to authors from George A. Scott, California State Dept. Agr., Sacramento, California.)

population in California. With a more favorable outlook for beef cattle there will undoubtedly be a physical as well as an economic limit to the possibilities for safe expansion in both the cattle and sheep industries. Expansion in areas not suited to the production of sheep

should be avoided. Unfavorable climatic conditions, especially with reference to rainfall, might play havoc with the industry in places without sufficient and favorable feed. Newcomers should realize that the possibilities for profitable sheep production will become less as the sheep population of the state increases.

DENSITY OF SHEEP POPULATION, CALIFORNIA, 1929

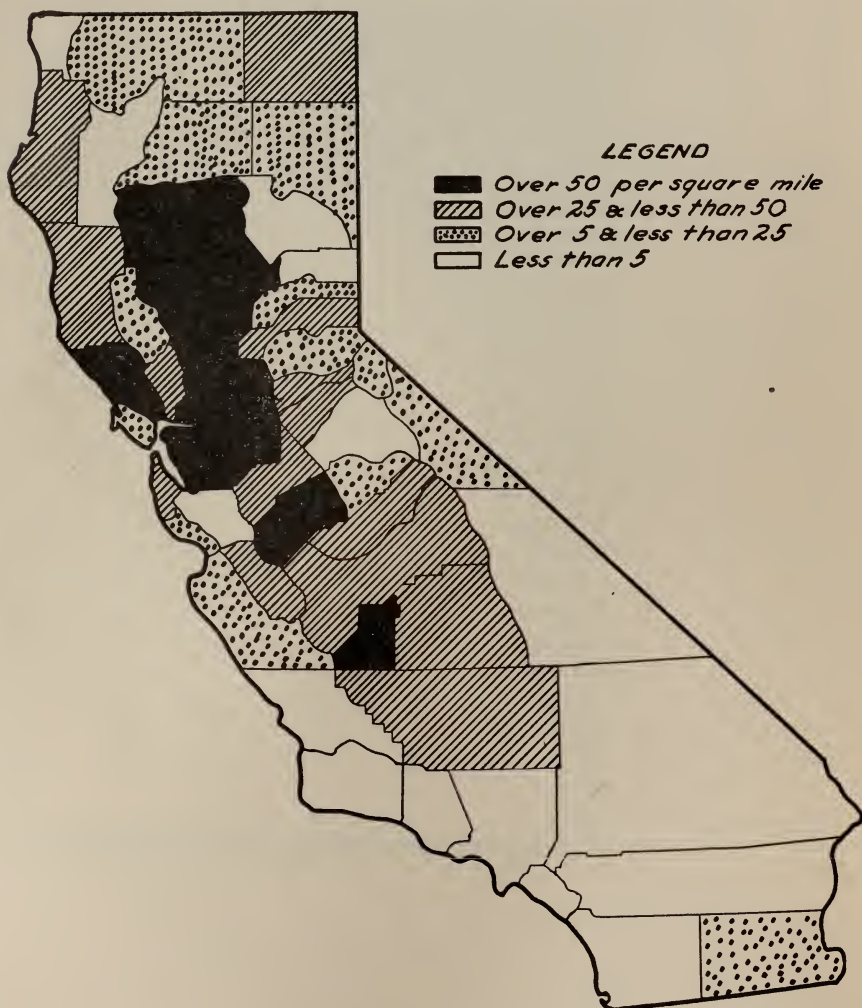


Fig. 6.—The densest sheep population per square mile is in the valley counties of the Sacramento and San Joaquin, with the north coast counties following. Except in Imperial Valley where sheep feeding operations are important, the density of sheep in southern California is low. (Data computed by authors from 1929 estimates of number of sheep in the counties of the state reported to authors by the California State Dept. Agr., and the area of the counties of the state.)

Estimated Number of Breeding Ewes and Indicated Lamb Crop, United States and California.—Since 1924 estimates on the number of breeding ewes over one year old and on the indicated lamb crop of the nation have been made by the United States Bureau of Agricultural Economics (tables 6, 7, and 8). These data serve to substantiate the statements already made with reference to the expanding phase of the sheep cycle. It should be apparent that the rate of increase in the number of breeding ewes cannot long continue without a decrease in the purchasing power of the increased lamb crop which

SHEEP POPULATION ON FARMS, UNITED STATES, JANUARY 1, 1900-1929

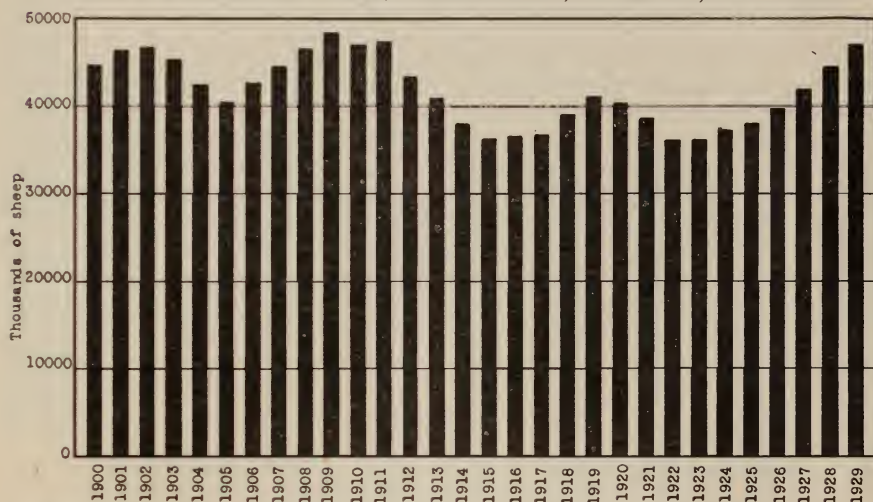


Fig. 7.—Since 1900, the sheep population of the nation has moved in more or less irregular cycles. If this cyclical movement continues it is evident that a downward movement in population should set in during the next few years. (Data from the Bur. Agr. Econ. Estimates on total number on farms and elsewhere have been published in: Roberts, John. Food Animals and meat consumption in the United States. U. S. Dept. Agr. Cir. 241:1-24. 1929.)

will result. The percentage increase in the number of breeding ewes has been substantially the same in the western sheep states as in the native sheep states (table 6), and the rise in California since 1925 has been almost twice as great as that of the nation. There is need for caution in considering future increases. The lamb crops of the state and nation have shown the same general tendency to expand. Sheepmen of the state are urged to study the reports of the United States Bureau of Agricultural Economics appearing in "Crops and Markets" and current issues of the Market News Service on Livestock, Meats, and Wool issued by the San Francisco and Los Angeles offices, United States Bureau of Agricultural Economics.

Relative Importance of Meat and Wool.—The estimated sales of sheep and lambs for meat in 1899 in the United States provided 52.3 per cent of flock receipts, while sales of wool accounted for the remaining 47.7 per cent. Corresponding data for 1909, 1919, and 1924 were 56.4, 43.6; 56.6, 43.4; and 57.5, 42.5 respectively.¹¹ The growing importance of sheep and lambs as compared with wool can be dis-

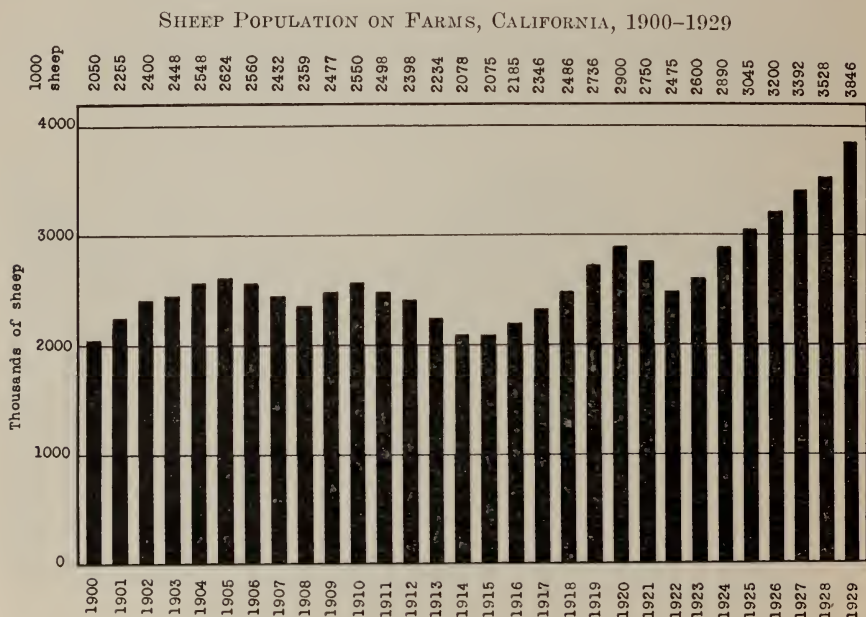


Fig. 8.—California's sheep population has fluctuated less than that of the nation and during the past thirty years there has been a tendency for numbers to increase. The expansion since 1922 has been rapid. Since 1910 the movements within the state correspond closely with those in the nation. (Compare with fig. 7.) (Data from E. E. Kaufman, State Statistician, Sacramento, California.)

cerned by examining table 9. Although the designations in this table are not the same as those just quoted it may be seen that during the eight years, 1919-1926 inclusive, the value of animals raised showed a pronounced tendency to increase when compared with wool. In 1926 the value of animals raised accounted for 67.6 per cent of the combined values of sheep and wool.

The growing importance of meat does not necessarily indicate that there has been a distinct change in the relationship between the unit prices of lamb and wool. During the past 30 years there does not seem to have been a definite trend in this relationship (fig. 9).

¹¹ Census data.

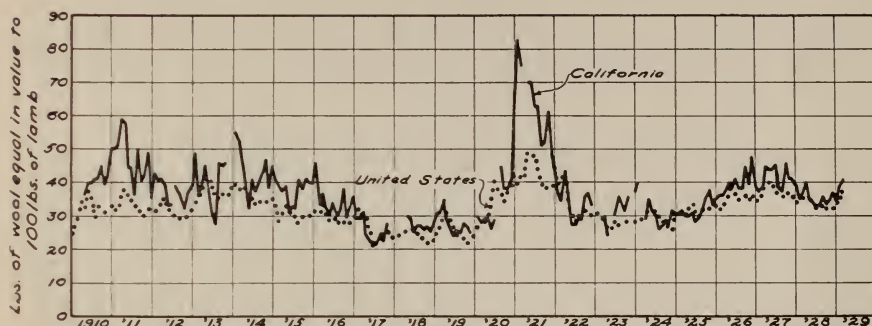
EXCHANGE VALUE OF LAMBS IN TERMS OF WOOL, UNITED STATES AND CALIFORNIA,
1910-1929

Fig. 9.—With both lamb and wool, prices used are those paid to producers. There has not been a distinct and definite trend in the price relationships of these two products. After the entry of the United States into the War and before the middle of 1920 wool prices were relatively high in comparison with those received for lambs. During the latter part of 1920 and especially in 1921 and early in 1922 the price of wool went to low levels. Recovery was exceptionally rapid. From the latter part of 1925 until 1927 the relationship tended to favor lamb. (Data computed by authors on the basis of prices for lambs and unwashed wool in California. Breaks in California data are caused by the absence of price data on wool.)

TABLE 6
ESTIMATED NUMBER OF BREEDING EWES AND ESTIMATED LAMB CROP,
UNITED STATES, 1925-1929

Division	Breeding ewes (thousands)					Indicated lamb crop (thousands)				
	1925	1926	1927	1928	1929	1925	1926	1927	1928	1929
North Atlantic	711	725	716	745	735	718	647	769	737	695
South Atlantic	879	864	893	953	1,037	973	855	1,026	1,046	1,177
East North Central	3,043	3,049	3,190	3,344	3,422	2,917	2,815	3,239	3,216	3,341
West North Central	2,082	2,208	2,386	2,536	2,662	2,082	2,166	2,521	2,640	2,732
South Central	1,069	1,064	1,168	1,262	1,339	1,088	1,046	1,320	1,353	1,386
Native sheep states*	7,784	7,910	8,353	8,840	9,195	7,778	7,529	8,875	8,992	9,331
Western sheep states (including Texas and South Dakota)	18,199	18,527	19,351	20,574	22,048	14,420	16,243	15,278	17,233	16,645
United States	25,983	26,437	27,704	29,414	31,243	22,198	23,772	24,153	26,225	25,976

* The native sheep states are those in which sheep are produced ordinarily in small flocks, on farms of the central, southern and eastern states.

Sources of data: G. A. Scott, Livestock Statistician, U. S. Dept. Agr. and Calif. State Dept. Agr.

Increasing Productivity of Sheep.—Comparisons between numbers of livestock are not always reliable indices for comparisons of product output. Such comparisons leave out of account the efficiency of the animals concerned. Improved methods of breeding and livestock management have unquestionably had a share in increasing the pro-

TABLE 7
PERCENTAGE LAMB CROP, UNITED STATES, 1925-1929

Division	1925	1926	1927	1928	1929
North Atlantic.....	101.0	89.2	107.4	98.9	94.6
South Atlantic.....	110.7	99.0	114.9	109.8	113.5
North Central.....	95.9	92.3	101.5	96.2	97.6
West North Central (excluding South Dakota).....	100.0	98.1	105.7	104.1	102.6
South Central (excluding Texas).....	101.8	98.3	113.0	107.2	103.5
Native sheep states.....	99.9	95.2	106.2	101.7	101.5
Western sheep states (including Texas and South Dakota).....	79.2	87.7	79.0	83.8	75.5
United States.....	85.4	89.9	87.3	89.2	83.1

Source of data: Computations by authors based upon table 6.

TABLE 8
ESTIMATED NUMBER OF BREEDING EWES AND LAMB CROP, CALIFORNIA, 1924-1929
(All numbers of sheep and lambs in thousands)

	1924	1925	1926	1927	1928	1929
Total sheep, Jan. 1.....	2,890	3,045	3,200	3,392	3,528	3,846
Ewes, 1 year and over, Jan. 1.....	2,111	2,231	2,280	2,367	2,486	2,722
Lambs, docked { Number.....	1,900	1,938	2,143	2,130	2,387	2,395
{ Per cent.....	90.0	87.0	94.0	90.0	96.0	88.0
Lambs, raised { Number.....	1,815	1,822	2,052	2,048	2,262	.....
{ Per cent.....	86.0	82.0	90.0	86.5	91.0	.....
Proportion of early lambs (per cent).....	68*	70	70	70	72	75
Estimated number of early lambs raised.....	1,234	1,275	1,436	1,434	1,629	1,796

* Docked.

Source of data: G. A. Scott, Livestock Statistician, U. S. Dept. Agr. and Calif. State Dept. Agr.

ductivity of the sheep flocks of this country. A great deal of the increased efficiency is due to changing over from the Merino breed to cross-breeds of one kind or another. Almost any cross, made on the Rambouillet or Merino, is much more prolific than the parent Merino stock. The discrepancy between increases in numbers and actual production has been pointed out in recent studies in the poultry, dairy, and beef industries.¹²

¹² Voorhies, Edwin C. The California poultry industry: a statistical study. California Agr. Exp. Sta. Bul. 413:1-172. 1926. (Out of print.)

Voorhies, Edwin C. Economic aspects of the dairy industry. California Agr. Exp. Sta. Bul. 437:1-192. 1927. (Out of print.)

Voorhies, Edwin C., and A. B. Kougan. Economic aspects of the beef cattle industry. California Agr. Exp. Sta. Bul. 461:1-128. 1928.

TABLE 9

ESTIMATED GROSS VALUE OF FARM PRODUCTION, UNITED STATES, 1919-1926
(Values in millions of dollars, i.e., 000,000 omitted)

Year	Crops		Animal products	Total crops not fed and animal products	Sheep raised	Wool produced	Per cent sheep and wool (cols. 6 and 7) are of:	
	Gross	Not fed to live-stock					Total animal products (col. 4)	Total products (col. 5)
1	2	3	4	5	6	7	8	9
1919	16,561	9,402	8,275	17,677	135	128	3.18	1.49
1920	11,578	7,102	7,709	14,811	95	90	2.40	1.25
1921	7,759	4,679	5,589	10,268	68	36	1.86	1.01
1922	9,430	5,560	5,651	11,211	124	69	3.42	1.72
1923	10,401	6,111	6,271	12,382	143	87	3.67	1.86
1924	10,770	6,317	5,902	12,219	150	89	4.05	1.96
1925	10,170	6,387	6,647	13,034	176	95	4.08	2.08
1926	9,266	5,685	7,300	12,985	177	85	3.59	2.02

Sources of data: Cols. 2, 3, 4, 5, U. S. Dept. Agr. Estimated gross value of farm production. U. S. Dept. Agr. Crops and Markets 4(7): 251. 1927. Cols. 6, 7, U. S. Dept. Agr. Farm production. U. S. Dept. Agr. Yearbook 1923: 1143-1144. 1924. U. S. Dept. Agr. Estimated gross value of farm production. U. S. Dept. Agr. Crops and Markets 1 (3): 84. 1924; *ibid.* 3(7): 226. 1926; *ibid.* 4(7): 251. 1927. Cols. 8 and 9 computed by authors.

PER CAPITA SHEEP POPULATION AND PER CAPITA SLAUGHTER OF SHEEP,
UNITED STATES, 1900-1928

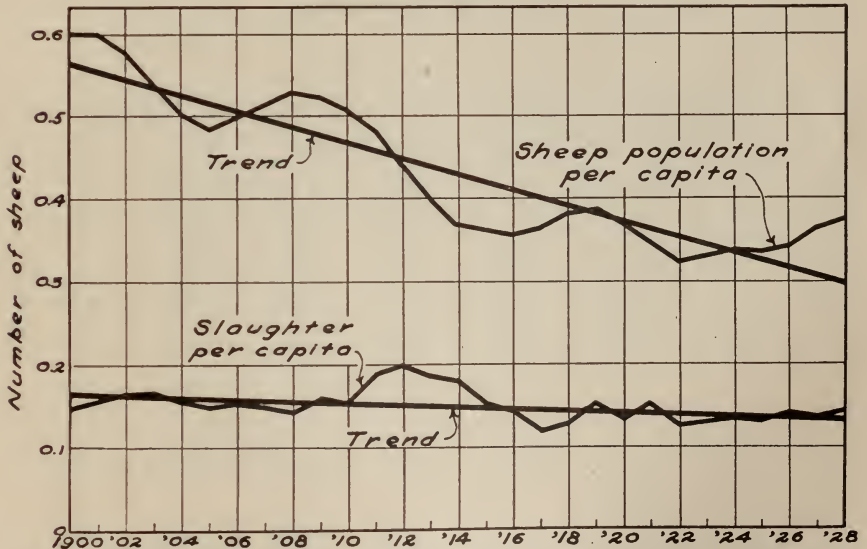


Fig. 10.—Since 1900 there has been a steady decline in the number of sheep per human inhabitant in the United States. There has been only a slight decline in the sheep slaughtered per human inhabitant. (See also fig. 11.) The per capita sheep slaughter will probably increase during the next two years, which will have a tendency to lower prices somewhat. (Data calculated by authors on basis of estimated sheep and lamb population and slaughter together with estimates of the human population furnished by the Bureau of the Census.)

The number of sheep per capita in the United States dropped from 0.569 head in 1900 to 0.301 head in 1928, a decrease of 0.268 head per capita or 47.1 per cent. These values are calculated from the trend¹³ of the per-capita sheep population. Comparisons between the actual data for the two years in question show a decrease of 36.1

SHEEP POPULATION AND THE TOTAL NUMBER SLAUGHTERED, UNITED STATES,
1900-1928



Fig. 11.—The total sheep population has shown a downward tendency during the past twenty-eight years. It moves in fairly regular cycles. Since 1922 sheep numbers have been increasing rapidly and indications are that the peak of the cycle is at hand or near. The actual slaughter of sheep has been increasing since 1900. This increase has come about largely through the change to a ewe and lamb basis, and through a swing in many sections toward mutton breeds. In addition, improved methods of breeding, feeding, and management have undoubtedly aided in stimulating this increase. Compare with figure 10. (Data on sheep population 1900-1919, inclusive, from U. S. Dept. Agr. unpublished data; 1920-1928, from table 4. Data on slaughter from table 17.)

per cent. The per-capita sheep slaughter during the same period has dropped from 0.1703 to 0.1382 head per person, or 18.9 per cent.¹⁴ The actual decrease was 8.5 per cent, using only the years 1900 and 1928 for computations.

The per-capita consumption data for lamb and mutton covering the same period show a decrease of 28.6 per cent (fig. 10).¹⁵ It might

¹³ Equation of the line of trend of the per-capita sheep population in the United States, 1900-1928 is $y = 0.4354 - 0.0096x$, origin July 1, 1914.

¹⁴ Equation of the line of trend of the per-capita slaughter of sheep in the United States, 1900-1928, is $y = 0.1542 - 0.0011x$, origin July 1, 1914.

¹⁵ Equation of the line of trend of the per-capita consumption of lamb and mutton in the United States 1900-1928 is $y = 6.214 - 0.074x$, origin July 1, 1914.

be expected that the decrease in the per-capita consumption of lamb and mutton would be greater than the per-capita slaughter of sheep and lambs because of the tendency to market lambs instead of yearlings or older sheep. This would indicate an increase in sheep slaughter when compared with sheep population, but with the lighter weights of the animals slaughtered, a decrease in per-capita consumption when compared with per-capita slaughter. Although many factors complicate the local situation in California, indications point to an increased output per animal in this state.

TABLE 10

ESTIMATED NUMBER OF BIRTHS PER THOUSAND SHEEP, UNITED STATES, 1900-1927

Year	Number	Year	Number	Year	Number
1900	284	1909	316	1918	389
1901	249	1910	296	1919	311
1902	238	1911	368	1920	360
1903	250	1912	371	1921	378
1904	363	1913	428	1922	484
1905	373	1914	432	1923	391
1906	354	1915	427	1924	443
1907	337	1916	395	1925	483
1908	283	1917	403	1926	472
				1927	462

Source of data: Computations by authors.

The increased efficiency of sheep production in the United States can also be shown in part by comparisons between the trends of total population of sheep since 1900 and the trends of slaughter since that date (fig. 11).¹⁶ The sheep population of the entire country decreased 14.6 per cent (trend value) while the estimated sheep slaughter increased 25.0 per cent.¹⁷

Data showing the trend toward earlier marketing are not available. However, since 1892 data on the average weight of sheep and lambs received at Chicago indicates that there has been a distinct trend toward lighter weights (p. 28).

Another important factor in the increased efficiency in sheep production in the United States has been a decided improvement in the number of births per thousand sheep. A change in the mutton breeds has been responsible for a considerable amount of this increase. The data in table 10 have been calculated in the following manner:

¹⁶ Equation of the line of trend of the sheep population in the United States 1900-1928 is $y = 41,677,310 - 234,560x$, origin July 1, 1914.

¹⁷ Equation of the line of trend of the slaughter of sheep and lambs in the United States 1900-1928 is $y = 15,010,069 + 119,130x$, origin July 1, 1914.

The sheep slaughtered during a calendar year represent the number of sheep replaced by births plus the sheep liquidated from flocks, compared to the previous year. If the sheep population diminishes from one year to the next, the decrease approximately measures animals slaughtered above the rate of reproduction. If the sheep population expands from one year to the next, the increase plus the sheep slaughtered measures the births of the preceding year.¹⁸ Table 10 shows that there has been a gradual rise in the births of livestock per thousand animals. These data have been calculated on the basis of the latest tentative figures of the United States Department of Agriculture. It is probably true that the greater part of this increase has come about by the adoption of the ewe and lamb basis by the industry. Improvements in management may have been responsible for a part of the rise in birth rate.

The same general conclusion has been stated by Armour's Livestock Bureau,¹⁹ although the data published by them checks only in a general way with that assembled by the authors.

Lighter Weights.—Since 1892, there has been at Chicago a distinct trend toward lighter weights for sheep. During the period 1892–1928 the percentage decrease in the average body weight of sheep received was 10.55 (trend values).²⁰ From 1892 to 1910, inclusive, the average weight of sheep received varied from 81 to 89 pounds. Since the latter date the yearly average weights have been from 76 to 80 pounds.²¹

The trend toward lighter weights in California cannot be definitely measured, owing to lack of sufficient data. Undoubtedly the change from a mature mutton to a lamb basis has reduced the average weight considerably. It is stated that prior to 1900, San Francisco killers did not purchase many lambs, preferring aged wethers, yearling wethers, and ewes. Since that time a gradual change has been made until at present mature sheep constitute less than 6 per cent of the total slaughter (table 22).

¹⁸ The authors are indebted to Armour's Livestock Bureau for the method used in making these calculations.

¹⁹ Armour and Company. Increasing productivity of American livestock herds. Monthly Letter to Animal Husbandmen 8(2):1–4. 1927.

²⁰ Equation of the line of trend of the average weight of sheep and lambs received at Chicago is $y = 81.30 - .25x$, origin July 1, 1910.

²¹ Data taken from Chicago Daily Drovers Journal. Average weight of sheep and lambs at Chicago. Drovers Journal Year Book of Figures 1928:70. 1929.

Trends in the weights of sheep and lambs slaughtered in California during selected years since 1920 are shown in table 11. The total slaughter indicated is not absolute, as the Census Bureau does not release data for a town in which only one slaughterer is located. The total yearly slaughter is greater than is indicated by these figures; it approximates 1,700,000 head (table 21).

BEEF-CATTLE—LAMB PRICE RATIO, CALIFORNIA, 1910-1928

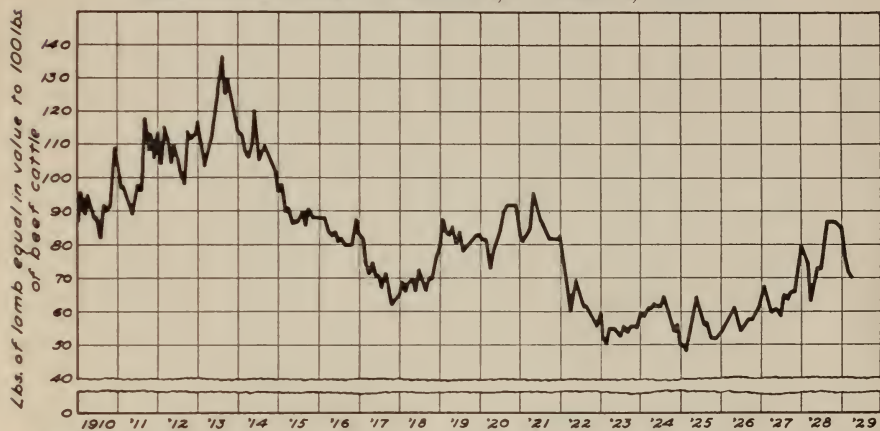


Fig. 12.—The graph in the above figure represents the number of pounds of lamb which 100 pounds of beef cattle would purchase. From 1910 to 1914, this averaged over 100 pounds. Since the latter date, beef has been able to purchase less lamb. Beginning in 1926 prices of beef cattle commenced to gain on those for lambs. (Data computed by authors from table 30 and from table 33, p. 73, in: Voorhies, Edwin C., and A. B. Koughan. *Economic aspects of the beef cattle industry*. California Agr. Exp. Sta. Bul. 461:1-128. 1928.)

Ewe and Lamb Basis of Production.—Most flocks are now operated upon a ewe and lamb basis. Texas still carries about a half million wethers. In some sections of California and among the Indian-owned flocks of the southwest a few wethers are found. There are only a scattered few in other areas.²²

Seasonal Variation in Birth Rate, United States.—Sheep births are apparently less uniform throughout the year than either those of cattle or swine. Roberts²³ in a study of the seasonal distribution of sheep births reports that almost 97 per cent of the lambs are born during the first six months of the year, May claiming the largest number. February, March, and April are also above the average. With the increase in shipments of spring lambs from California

²² Scott, George A. Sheep and lambs in the 13 western range states. Mimeographed report issued by Regional Livestock Office, U. S. Dept. Agr. Bur. Agr. Econ. Salt Lake City, Utah. Mar. 5, 1928.

²³ Roberts, John. Food animals and meat consumption. U. S. Dept. Agr. Dept. Cir. 241:7. 1929.

during the past few years the percentage of births during the last months of the year would undoubtedly be higher than that indicated by Roberts (table 12). Lambing periods in California are discussed on p. 31.

Shifts from Cattle to Sheep.—In many areas, particularly in the west, cattle compete with sheep for the use of range lands. The relatively high values of sheep since 1922 and the relatively low values of cattle from 1921 to the latter part of 1927 (fig. 12) have caused some shifting. The total number of cattle in the United States declined from 1920 to 1928 in all subdivisions.²⁴ The number of dairy cattle in the nation remained fairly uniform, making for an even greater decline in the number of cattle used for strictly beef purposes, the decrease in the latter animals being approximately 30 per cent. Since 1922, the number of sheep has increased in all sections of the country, but this rise has been more gradual than the decrease in the number of cattle. Converting both cattle and sheep into animal units,²⁵ since 1920 there has been a steady decline in the United States and the western states. This downward tendency is even more marked if instead of 'all cattle' those generally known as 'other cattle' are used in making computations. The shift during the past few years can be seen from a study of the number of cattle and sheep grazing in the national forests. From 1918–1927 inclusive, there was a decrease in the number of cattle grazed amounting to 34.4 per cent, while sheep numbers declined 24.6 per cent. During the five years 1923–1927, the number of sheep grazing in the national forests has remained stationary, while cattle numbers have declined.

The situation is entirely different in California. Whether 'all cattle' or 'other cattle' is used and together with sheep converted into 'animal units,' this state has varied but little in the total animal units (cattle and sheep) carried during the past eight years. In fact, since 1925 there has been a slight increase in the number of 'animal units' as represented by sheep and cattle. If the number of cattle remains stationary it is highly probable that any expansion in the sheep industry will be on lands not now devoted to either sheep or cattle production.

²⁴ Voorhies, Edwin C., and A. B. Koughan. Economic aspects of the beef cattle industry. California Agr. Exp. Sta. Bul. 461:15–24. 1928.

²⁵ 'Animal unit' is employed to reduce the different kinds of livestock to one class, insofar as their relation to the consumption of feed is concerned. It is roughly estimated that the amount of forage required to maintain one mature cow one year would be sufficient to maintain for the same period 1 horse, mule or steer, 5 hogs, 7 sheep or goats, or 100 poultry. Colts, calves, pigs, and lambs are estimated to require one-half as much feed as mature animals.

Data on the number of sheep and cattle grazed on the national forests of the state (table 54) give indications that in this state sheep numbers have increased since 1910, while cattle numbers have declined. During the past five years the number of cattle grazed has declined far more rapidly than the number of sheep.

TABLE 11
SLAUGHTER OF SHEEP AND LAMBS IN WHOLESALE SLAUGHTERING PLANTS,
CALIFORNIA, 1909, 1914, 1919, 1921, 1923, 1925

Year	Number reported	Hoof weight	Dressed weight	Average weight	
				Alive	Dressed
		<i>pounds</i>	<i>pounds</i>	<i>pounds</i>	<i>pounds</i>
1909	1,071,998	89,943,570	44,502,000	83.90	41.51
1914	1,427,250	113,296,370	57,499,522	79.38	40.29
1919	1,198,079	92,332,195	45,179,846	77.07	37.71
1921	1,536,027	119,203,073	58,255,616	77.60	37.93
1923	1,607,538	113,900,463	61,008,644	70.85	37.95
1925	1,558,438	120,645,660	59,793,392	77.41	38.37

Source of data: U. S. Dept. Com., Bur. of the Census.

TABLE 12
PERCENTAGE OF SHEEP BIRTHS DURING THE YEAR, UNITED STATES

Month	Percentage	Month	Percentage
January	3.5	July	0.9
February	10.1	August	0.4
March	20.8	September	0.5
April	27.0	October	0.5
May	28.5	November	0.4
June	6.8	December	0.6

Source of data: Roberts, John. Food animals and meat consumption. U. S. Dept. Agr. Dept. Cir. 241: 7. 1924. (Note comment in text, p. 49).

When sheep are first placed on ranges formerly occupied by cattle they often utilize grasses not previously consumed. The ranges may seem to lose in productivity after a few years because of this and because of the infestation of the pastures with sheep parasites. New-comers should be especially careful not to overestimate the productivity of such ranges.

Lambing Season in California.—The lambing season in California usually extends from the middle of October to the first of May (fig. 13), since the methods of handling sheep are diverse in different sec-

LAMBING SEASONS IN CALIFORNIA



Fig. 13.—The above map is intended to show the approximate months for lambing in various areas of the state. In certain sections within the areas drawn, either on account of climatic conditions or because of methods of management, lambing dates may be at variance with the dates shown above. The approximate time for lambing in the various sections is as follows: I—November, December, January; II—October 10-30, November, December, January, February 1-15; III—February (lambs and ewes go to the mountains about May 1); IV—upper section—January, February 1-20; lower section—January, February, March 1-15; V—March 15-30, April; VI—November, December, January; VII—October 10-31, November, December, January. (Map prepared by authors in consultation with W. P. Wing, Secretary, California Wool Growers Association, San Francisco.)

tions of the state. Formerly a large percentage of lambs were born in the spring and marketed in the fall, but in recent years the practice of lambing in midwinter has expanded rapidly.

In recent years Imperial Valley has furnished winter quarters for thousands of range ewes that are bred for early lambs. These ewes are usually purchased from rangemen in northern California, Arizona, Texas, and Nevada, the majority lambing in November and December. Some of the earliest fat lambs in the state originate in this section. In a limited area extending from Los Angeles to San Diego counties lambs are dropped during the latter part of the year and appear on the Los Angeles and San Diego markets during March, April, and May.

In the San Joaquin Valley the lambing season extends from the middle of October to March, the bulk coming in November, December, January, and early February. November, December, and January are the principal lambing months for the Sacramento Valley. In the upper part of the latter area a considerable number of sheep are lambed late in February. The lambs and ewes from this section are usually sent to the mountains about the first of May, the lambs as a rule being marketed during July. The San Joaquin and Sacramento valleys furnish the bulk of the lambs shipped east.

From the upper north coast region—Humboldt and Mendocino counties—lambs are sent to local markets during June, July, and the early part of August. In the northeastern counties of Modoc and Lassen a large number of lambs are dropped during April, a few shed lambs appearing during the last fifteen days of March. Many ewes in this section are wintered on the Nevada desert ranges and as summer approaches they are moved to mountain ranges either in California or Nevada. The lambs from these ewes are usually born in Nevada, and may be shipped from California or Nevada border points, depending upon feed conditions. They are marketed on the Pacific Coast or sent east, depending upon prevailing market prices. In the trade they are referred to as 'Nevada lambs' or lambs from 'over the hump.'

Because of the wide distribution of lambing areas and accompanying climatic differences, together with succulent feed, there is a succession of 'spring lambs.' Thus, during a remarkably short time—usually not to exceed five months—exceptionally heavy crops of lambs are produced. This succession of lambs results in a wide range in weights of dressed lamb carcasses on the market, often varying from

28 to 40 pounds. These differences cause comment by many retail buyers who do not understand conditions existing in California. Atlantic Coast operators have bid from two to three dollars per hundredweight lower on the weighty stock, not accepting it as genuine 'California spring lamb.' From the consumers' standpoint all may be equally well covered and desirable.

*Lamb-Crop Percentage.*²⁶—The percentage lamb crop of the native sheep states is considerably higher than that of the western range states (table 7). On account of the vicissitudes of climate, etc., the lamb crop in the western range states is highly variable. Compared with this latter group of states and the United States as a whole, California ranks high (tables 7 and 8). The number of lambs docked, or saved up to July first of each year approximates 88–90 per cent of the ewes on farms and ranges on January first of the corresponding year.

PUREBRED SHEEP

Number of Purebreds.—The last enumeration of purebred sheep was taken in 1920. At that time approximately 1.3 per cent of the country's sheep were purebred. Medium and fine-wool breeds were the most important numerically; Shropshire, Rambouillet, Merino, and Hampshire being the leading breeds, and representing approximately three-fourths of all the purebred sheep reported—Shropshires, 26.9 per cent; Rambouillets, 23.1 per cent; Merinos, 12.9 per cent; Hampshires, 11.2 per cent.

Although California ranked second in the number of sheep, this state was fifth in the number of purebreds, only 1.2 per cent of all sheep being classified as purebred. One of the main reasons for the smaller percentage of purebreds is the large size of the flocks in California (table 15). Fourteen and two-tenths per cent of the purebred Rambouillets in the United States were found within the borders of California. Corresponding percentages for the other more important breeds were: Merino, 8.4 per cent; Shropshire, 5.0 per cent; and Hampshire, 2.6 per cent. From the purebred standpoint the Ram-

²⁶ In an interview with the authors on Jan. 17, 1929, W. P. Wing, Secretary of the California Wool Growers Association stated: "F. R. Marshall, Editor of the National Wool Grower, claims that the percentage lamb crop is the most important sheep management problem today. With high costs of operation the man obtaining a lamb crop of from 100 to 130 per cent is the one who will make a profit. One hundred thirty per cent is not impossible under proper management year in and year out."

bouillet was most important, 52.6 per cent of the total number being of this breed. Corresponding percentages were: Shropshire, 21.7; Merino, 17.4; Hampshire, 4.8.

LOCATION OF PUREBRED SHEEP BREEDERS, CALIFORNIA, 1928



Fig. 14.—The majority of breeders of purebred sheep are located in the Sacramento Valley, particularly in Yolo and Solano counties. Although the San Joaquin Valley is an important sheep center, there are few breeders of purebred sheep. (Data secured from Division of Animal Husbandry, University Farm, Davis, Calif.)

Accurate data on purebred animals recorded from California over a period of years are not available. Letters from a number of breed-record associations, however, indicate a considerable increase in the number of purebred animals recorded.

Location of Purebred Breeders in California.—The Animal Husbandry Division of the University of California has compiled a list of the breeders of many types of sheep. The largest number is found in the Sacramento Valley (table 13) with considerable concentration in Yolo and Solano counties, the University Farm at Davis being the hub (fig. 14). The location of the sheep in the state and the holding of annual ram sales at Davis have been contributing factors to this concentration.

TABLE 13

NUMBER OF BREEDERS OF PUREBRED SHEEP IN CALIFORNIA, BY SECTIONS, 1928

Section	Shropshire	Rambouillet	Hampshire	Other breeds	Total
North coast.....	6	5	.....	7	18
South coast.....	4	2	2	3	11
Sacramento Valley.....	29	15	23	8	75
San Joaquin Valley.....	.....	2	6	3	11
Southern California.....	1	.....	2	4	7
Mountain.....	1	2	3	.....	6
Total.....	41	26	36	25	128

Source of data: Division of Animal Husbandry, College of Agriculture, University of California.

IMPORTANCE OF THE SHEEP INDUSTRY

United States.—According to the farm census of 1925, sheep were reported on 430,738 farms, or 6.76 per cent of the total number in the United States (table 15). The corresponding percentages for 1920 and 1910 were 8.4 and 9.6 respectively. The number of sheep per farm reporting sheep increased from 65 in 1920 to 83 in 1925, the corresponding number for 1910 being 85.9. The western states, including California, report large numbers of sheep per farm. It can readily be seen that aside from the western states sheep raising is of relatively minor importance in comparison with the main enterprise.

With the exception of the years 1920 and 1921, there has been a tendency during the period 1919 to 1926 inclusive, for the products of the sheep industry (animals raised plus wool) to occupy a more important place both with reference to the total of animal products and the total gross value of farm production (table 9). This tendency has been more marked with reference to the value of animals raised than with reference to the value of wool produced. In 1926, sheep raised accounted for 2.4 per cent of the value of animal production in the United States, contrasted with 22.8 per cent for swine

raised, 14.8 per cent for cattle raised and 7.7 per cent for poultry raised. Total production in the sheep industry in 1926 (animals

TABLE 14

TOTAL VALUE OF CERTAIN CLASSES OF LIVESTOCK AND VALUE OF SHEEP,* UNITED STATES AND CALIFORNIA, JANUARY 1, 1920-29
(Thousands of dollars, i.e., 000 omitted)

Year	United States			California		
	All livestock	Sheep	Per cent col. 2 is of col. 1	All livestock	Sheep	Per cent col. 5 is of col. 4
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
1920	8,125,459	420,942	5.18	222,436	31,610	14.21
1921	6,053,027	242,973	4.01	190,216	18,425	9.69
1922	4,757,971	173,693	3.65	152,396	13,118	8.61
1923	5,047,557	272,676	5.40	160,707	21,060	13.10
1924	4,748,964	291,689	6.14	164,109	26,010	15.85
1925	4,675,893	369,612	7.90	146,528	28,140	19.20
1926	5,003,301	417,630	8.35	161,466	34,078	21.11
1927	5,033,321	406,588	8.08	162,664	33,806	20.78
1928	5,512,508	456,687	8.28	181,254	40,050	22.10
1929	5,952,713	500,058	8.40	201,148	41,527	20.64

* Classes included are: (1) horses and colts, (2) mules and mule colts, (3) milk cows—two years old and over, (4) all other cattle, (5) sheep and lambs, (6) swine—including pigs.

Source of data: Revised data from U. S. Bur. Agr. Econ. to authors.

TABLE 15

PERCENTAGE OF TOTAL FARMS IN CERTAIN SUBDIVISIONS OF THE UNITED STATES REPORTING SHEEP AND THE NUMBER OF SHEEP PER FARM REPORTING, 1925

Division or state	Total farms	Farms reporting sheep	Per cent of farms reporting sheep	Number of sheep per farm reporting sheep
United States.....	6,371,640	430,738	6.76	83
New England states.....	159,489	9,157	5.74	17
Middle Atlantic states.....	418,868	26,973	6.44	33
East north central states.....	1,051,572	143,202	13.62	31
West north central states.....	1,111,314	101,398	9.12	40
South Atlantic states.....	1,108,061	43,836	3.96	25
East south central states.....	1,006,052	45,208	4.49	26
West south central states.....	1,017,305	18,950	1.86	177
Mountain states.....	233,392	25,710	11.01	588
Pacific states.....	265,587	16,304	6.14	327
California.....	136,409	5,708	4.18	533

Source of data: Computations by authors on basis of 1925 Farm Census.

raised and wool produced) made up 3.59 per cent of the value of total animal products on farms and slightly over two per cent of the total gross value of farm production.

Comparisons of the total values of sheep with those of certain classes of livestock in the United States (table 14) indicate that there has been a tendency since 1922 for sheep to be relatively more valua-

PERCENTAGE OF FARMS WITH SHEEP, CALIFORNIA, 1925

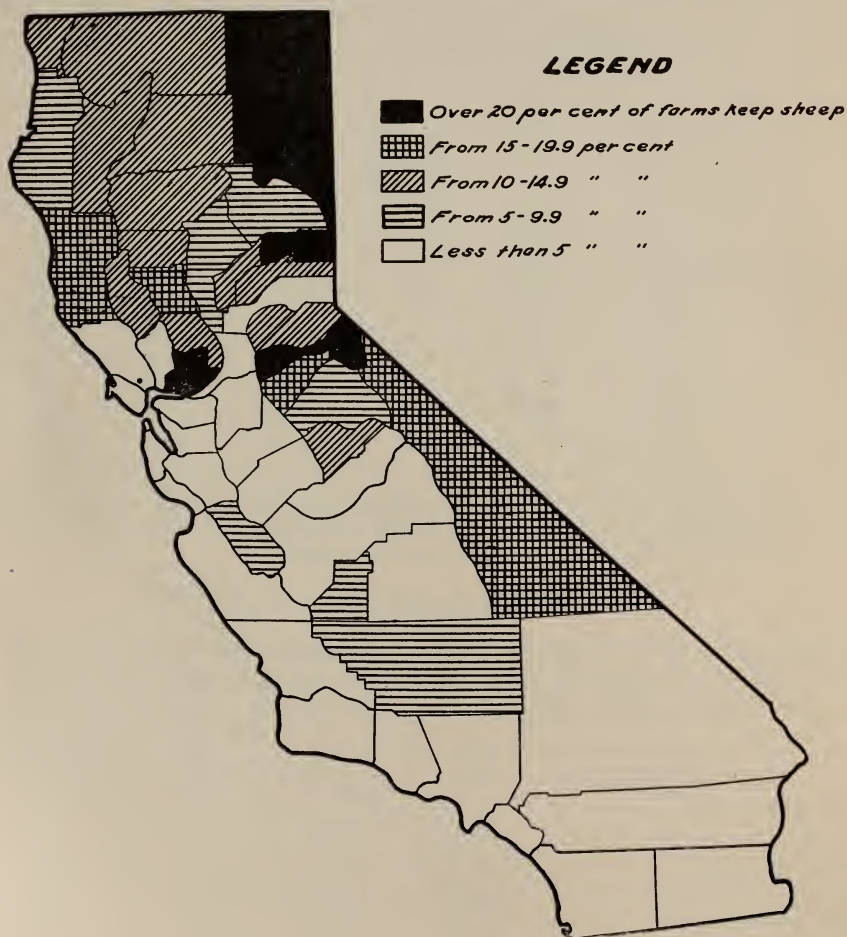


Fig. 15.—Sheep were kept on 4.18 per cent of the farms of the state in 1925. In that year they were more important to farmers in the Sacramento Valley, northern and eastern mountain counties, and north coast section than in other sections of the state. Generally speaking, sheep raising in California is more important in the regions of sparse human population. (Data computed by authors on the basis of the 1925 Farm Census.)

ble. These same valuations indicate that during 1921 and 1922 deflation in the sheep industry was relatively more severe than in the animal industries in general.

The sheep industry of the United States does not hold a relatively important position in the meat industry of the country. In 1928 out of the estimated national meat production of 16,955 million pounds, only 671 million were mutton and lamb.

California.—Annual estimates of the value of production of sheep, cattle, and hogs are made by the Division of Crop and Livestock Estimates. These estimates²⁷ for California, representing the gross farm value of stock sold off farms and ranges during 1928, are as follows:

Sheep, lambs, and wool	\$25,089,000
Cattle and calves	39,690,000
Hogs	15,808,000

TABLE 16

PERCENTAGE OF FARMS IN CALIFORNIA REPORTING SHEEP AND THE NUMBER OF SHEEP PER FARM REPORTING, 1925

Section	Total farms	Farms reporting sheep	Percentage of farms reporting sheep	Number of sheep (thousand)	Number of sheep per farm reporting
California.....	136,409	5,708	4.2	3,045	533
North coast.....	14,219	1,027	7.2	335	327
South coast.....	20,248	396	2.0	125	315
Sacramento Valley.....	20,922	2,196	10.5	1,314	598
San Joaquin Valley.....	40,456	1,421	3.5	945	665
Southern California.....	37,671	196	0.5	93	473
Mountain.....	2,892	472	16.3	234	495

Source of data: Computations by authors on basis of 1925 Farm Census.

Comparable estimates covering value of dairy and poultry products are not collected by the Division of Crop and Livestock estimates. The value of all butterfat sold in 1928, as compiled by the Bureau of Dairy Control, California State Department of Agriculture, was \$88,810,000. The value of chickens raised and eggs produced in 1924 as reported by the Census of Agriculture of 1925 was \$44,424,000.

The value of sheep and wool produced exceeded that for hogs, the sheep industry ranking fourth among the major animal industries of the state. Compared with others, California ranks high as a sheep and wool-producing state. On January 1, 1926, 1927, and 1928, respectively, this state ranked first in the total valuation of sheep. On January 1, 1929, both Texas and Montana outranked California in total sheep values. Sheep occupy a far more important place (relatively) in the animal husbandry of this state than they do in the livestock industry of the nation (table 14).

²⁷ California Cooperative Crop Reporting Service. Estimated value of the production of California livestock—1928. California Crop Report 1928:64. 1929.

According to the 1925 farm census sheep were kept on 4.18 per cent of the farms in California (table 16). Although this percentage is relatively smaller than that for the nation, average flock size, on the other hand, is larger.

In comparison with other types of agriculture, sheep raising is a more important part of the agriculture of the mountain counties than in any other section (fig. 15). In the percentage of farms keeping sheep this section was followed in order of importance by the Sacramento Valley, north coast, south coast, San Joaquin, and southern California sections. A similar situation was found in a recent study of the beef cattle industry.²⁸ Sheep raising is more important in those sections of the state possessing a relatively sparse human population. The same is true with beef cattle.

SLAUGHTER OF SHEEP

Number and Trend in the United States.—The number of animals slaughtered annually under United States inspection, together with the estimated total number killed (including those on farms) is shown in table 17. The number of sheep slaughtered under federal inspection is taken from accurate data. The uninspected slaughter, however, is an estimate, for the basis of which no recent figures are available. The monthly slaughter of sheep under federal inspection, together with the percentage monthly slaughter will be found in table 18.

From a study of data on sheep population and slaughter it may be seen that it is fallacious to use population data as a direct index of production. Peaks and depressions in the number of sheep slaughtered usually follow the high and low points in population. After the expansion in sheep numbers which reached a peak in 1909, the number of animals slaughtered rose rapidly to a record number in 1912. With a rapid decline in population slaughter reached a low point in 1917. During the War a considerable increase in slaughter occurred with a later recession which reached a low point in 1922. Since the latter date there has been a gradual increase in slaughter. With the continued increase in the sheep population of the country, sheep slaughter will undoubtedly be accelerated.

During the past seven years the sheep population of the United States has increased at the rate of over 1,500,000 head per year, the largest increases occurring during 1927 and 1928. In recent years

²⁸ Voorhies, Edwin C., and A. B. Koughan. Economic aspects of the beef cattle industry. California Agr. Exp. Sta. Bul. 461:33. 1928.

slaughter has been restricted by the tendency to expand flocks, although during 1928 it was larger than during any year since 1914. When this tendency ceases, greatly increased supplies of sheep and lambs—the equivalent of the yearly increase in flock numbers during

TABLE 17

NUMBER OF ANIMALS SLAUGHTERED ANNUALLY AND ESTIMATED TOTAL NUMBER
SLAUGHTERED (INCLUDING THOSE ON FARMS) IN THE UNITED STATES,
1900-1928

(Thousands, i.e., 000, omitted)

Year	Sheep and lambs		Cattle		Calves		Swine	
	Inspected	Total	Inspected	Total	Inspected	Total	Inspected	Total
1900	6,380	12,015	5,030	10,242	365	3,235	23,990	50,470
1901	7,037	12,358	5,390	11,088	490	3,585	24,960	51,870
1902	8,010	13,038	5,847	11,697	612	3,931	23,535	48,260
1903	8,424	13,683	6,242	12,463	717	4,221	22,961	47,900
1904	8,067	13,126	6,223	12,099	805	4,471	24,726	49,987
1905	7,873	12,823	6,727	12,649	846	4,744	25,324	51,540
1906	8,224	13,371	6,926	12,944	1,103	4,834	26,649	52,680
1907	10,252	13,360	7,633	13,287	2,024	6,211	32,885	54,058
1908	10,304	13,526	7,279	12,852	1,958	6,048	38,643	60,515
1909	11,342	14,725	7,714	13,611	2,189	6,516	31,395	53,220
1910	11,408	14,797	7,807	13,541	2,238	6,553	26,014	47,076
1911	14,020	18,057	7,619	12,958	2,184	6,264	34,133	56,646
1912	14,979	19,247	7,253	11,979	2,278	6,348	33,053	55,564
1913	14,406	18,520	6,978	11,478	1,902	5,285	34,199	57,046
1914	14,229	18,290	6,757	11,004	1,697	4,661	32,532	55,501
1915	12,212	15,756	7,153	10,822	1,819	4,640	38,381	62,017
1916	11,941	15,408	8,310	12,027	2,367	5,774	43,084	67,613
1917	9,345	12,149	10,350	13,724	3,143	7,031	33,910	56,901
1918	10,320	13,359	11,829	15,750	3,456	7,514	41,214	64,796
1919	12,691	16,317	10,091	14,838	3,969	8,445	41,812	65,190
1920	10,982	14,180	8,609	13,885	4,058	8,453	38,019	61,890
1921	13,005	16,710	7,608	12,271	3,808	7,771	38,982	62,957
1922	10,929	14,112	8,678	13,148	4,182	8,363	43,114	68,105
1923	11,529	14,862	9,163	13,883	4,500	8,824	53,334	79,843
1924	11,991	15,441	9,593	14,400	4,935	9,466	52,873	79,631
1925	12,001	15,454	9,853	14,706	5,353	10,099	43,043	68,294
1926	12,961	16,689	10,180	14,971	5,153	9,542	40,636	65,779
1927	12,883	16,589	9,520	14,000	4,876	9,030	43,633	69,250
1928	13,488	17,348	8,467	12,452	4,860	8,667	49,795	76,593

Source of data: Roberts, John. Meat production, consumption, and foreign trade in the United States, calendar years 1900-1928. U. S. Dept. Agr. Bur. Anim. Indus. mimeographed circular, pp. 1-9 1929.

the past few years—will be butchered. It is scarcely possible that the market can absorb the additional supply without reduction in price. Increase in slaughter during the past five years, averaging about 400,000 a year, has been largely offset by the upward trend in the consumer's demand for lamb. The domestic market can absorb some increase in lamb production each year, at least in line with the normal increase in population.

Centers of Slaughter.—Of the total slaughter under federal inspection (over 60 public stockyards) the five markets—Chicago, New York, Omaha, Kansas City, and South St. Joseph—accounted for over 71 per cent during the five-year period 1924–1928. The per-

TABLE 18
MONTHLY SHEEP AND LAMB SLAUGHTER UNDER FEDERAL INSPECTION AND
PERCENTAGE MONTHLY SLAUGHTER, 1915–1929

Slaughter
(Thousands, i.e., 000 omitted)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1915	1,196	946	986	830	739	883	984	1,139	1,220	1,116	1,132	1,041	12,212
1916	976	904	861	769	854	990	930	1,173	1,158	1,172	1,121	1,033	11,941
1917	956	819	861	777	632	710	688	766	740	822	764	809	9,345
1918	780	655	736	614	659	737	869	937	1,029	1,194	1,139	971	10,320
1919	1,004	754	738	808	894	931	1,160	1,234	1,292	1,414	1,227	1,235	12,691
1920	955	828	788	714	671	818	1,048	1,042	1,151	1,068	968	932	10,982
1921	1,068	958	1,075	1,041	985	1,116	1,060	1,237	1,249	1,285	1,040	890	13,005
1922	954	776	837	739	872	1,028	964	1,024	1,013	981	882	858	10,929
1923	1,021	836	977	960	972	914	962	957	990	1,046	915	978	11,529
1924	1,083	912	868	860	959	975	1,051	1,063	1,150	1,148	950	972	11,991
1925	990	854	984	1,012	1,030	999	1,071	1,031	1,086	1,083	879	981	12,001
1926	1,039	988	1,163	994	959	1,081	1,042	1,093	1,224	1,167	1,039	1,172	12,961
1927	1,115	1,006	1,027	960	992	1,058	1,014	1,168	1,185	1,194	1,070	1,094	12,883
1928	1,151	1,048	1,016	918	1,015	1,109	1,076	1,196	1,307	1,409	1,189	1,053	13,488
1929	1,150	953	1,006	1,119	1,202	1,108	1,255	.....	.....	.....	.....	.....	.....

PERCENTAGE MONTHLY SLAUGHTER

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1915	9.79	7.75	8.07	6.80	6.05	7.23	8.06	9.33	9.99	9.14	9.27	8.52	.....
1916	8.17	7.57	7.21	6.44	7.15	8.29	7.79	9.82	9.70	9.81	9.39	8.65	.....
1917	10.23	8.76	9.21	8.31	6.76	7.60	7.36	8.20	7.92	8.80	8.18	8.66	.....
1918	7.56	6.35	7.13	5.95	6.39	7.14	8.42	9.08	9.97	11.57	11.04	9.41	.....
1919	7.91	5.94	5.82	6.37	7.04	7.34	9.14	9.72	10.18	11.14	9.67	9.73	.....
1920	8.70	7.54	7.18	6.50	6.11	7.45	9.54	9.49	10.48	9.73	8.81	8.49	.....
1921	8.21	7.37	8.27	8.00	7.57	8.58	8.15	9.51	9.60	9.88	7.80	6.84	.....
1922	8.73	7.10	7.66	6.76	7.98	9.41	8.82	9.37	9.27	8.98	8.07	7.85	.....
1923	8.86	7.25	8.47	8.33	8.43	7.93	8.34	8.30	8.59	9.07	7.94	8.48	.....
1924	9.03	7.61	7.24	7.17	8.00	8.13	8.76	8.86	9.59	9.57	7.92	8.11	.....
1925	8.25	7.12	8.20	8.43	8.58	8.32	8.92	8.59	9.05	9.02	7.32	8.17	.....
1926	8.02	7.62	8.97	7.67	7.40	8.34	8.04	8.43	9.44	9.00	8.02	9.04	.....
1927	8.65	7.81	7.97	7.45	7.70	8.21	7.87	9.07	9.20	9.27	8.31	8.49	.....
1928	8.53	7.77	7.53	6.81	7.53	8.22	7.98	8.87	9.69	10.45	8.82	7.81	.....

Sources of data: Slaughter, U. S. Dept. Agr. Slaughter under federal inspection. Crops and Markets, monthly issues. Percentage monthly slaughter computed by authors.

centages for the different cities were as follows: Chicago, 25.3; Omaha, 14.3; New York and Jersey City, 13.2; Kansas City, 10.2; and St. Joseph, 8.7. A larger proportion of the sheep and lambs slaughtered in the United States is handled under federal inspection than any other class of livestock. Out of a total killing in 1928 estimated at 17,348,000 head, 13,488,000, or 77.8 per cent, were slaughtered under

federal inspection. In the same year 68 per cent of the cattle, 65 per cent of the hogs, and 54 per cent of the calves butchered were federally inspected.

California has been attaining a place of increasing importance in the sheep and lamb slaughter of the United States. In 1899 this state accounted for 7.6 per cent of the sheep and lambs killed for market in the country.²⁹ By 1919, the percentage had risen to 8.9 per cent, and during the three years 1925-1928, the state accounted for over 10 per cent of the total slaughter (1925, 10.9 per cent; 1926, 10.4 per cent; 1927, 10.3 per cent; 1928, 10.1 per cent.)

Age Classification of Sheep Slaughtered in the United States.—Since July, 1922, the United States Department of Agriculture has

TABLE 19

PERCENTAGE OF LAMBS AND YEARLINGS SLAUGHTERED IN THE TOTAL RECORDED SLAUGHTER OF SHEEP AND LAMBS IN THE UNITED STATES, 1922-1929

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1922	.....	.....	.....	.....	.....	.....	91.20	88.80	86.59	79.46	83.41	85.35	.....
1923	82.90	83.16	89.82	88.83	81.08	87.49	89.31	88.79	89.53	88.74	83.74	88.27	.....
1924	89.78	87.79	92.08	87.75	85.52	89.99	92.41	88.56	84.22	91.04	91.36	91.59	.....
1925	87.31	89.70	91.28	91.76	88.15	91.92	92.69	88.65	91.19	88.59	90.63	85.02	.....
1926	88.36	93.47	95.23	92.00	81.07	87.96	91.69	92.31	88.89	90.64	90.51	91.54	90.38
1927	94.32	93.81	88.25	89.02	89.15	89.41	93.55	87.65	90.52	92.11	91.73	92.45	91.09
1928	93.36	92.79	92.93	93.33	88.16	90.71	90.40	93.01	92.63	90.45	90.79	92.34	91.74
1929	92.59	93.12	94.15	91.56	87.12	89.94	.....	.....	.....	.....	.....	.....	.....

Sources of data: 1922-1925. U. S. Dept. Agr. Livestock slaughter statistics. U. S. Dept. Agr. Yearbook 1925: 1187. 1926. 1926-1928 and current data in monthly issues of U. S. Dept. Agr. Crops and Markets.

been collecting information on the number of (1) sheep and (2) lambs and yearlings slaughtered. These reports (table 19) constitute 75 to 85 per cent of the sheep slaughtered under federal inspection. From these data indications point to an increase during the past six years in the relative number of lambs and yearlings killed for the market. It is highly probable that during periods of prosperity in the industry relatively fewer sheep of all ages would be slaughtered because stockmen would breed sheep over as long a period as possible. During the years 1922 and 1923 sheepmen were forced to liquidate holdings, which necessitated the slaughter of a high percentage of sheep during these years. One of the serious problems in forecasting livestock production has been the determination of breeding stock available on farms and ranches. Data available over a series of years

²⁹ U. S. Census data.

on the age classification of sheep slaughtered should in a general way give some indication of the number of breeding animals retained on farms.

The percentage of lambs slaughtered in May is low (table 19). The total slaughter of sheep and lambs is also low during that month (table 18). California shipments of lambs are high during May, the peak month of the year. While these statements bring out one of the great advantages which this state possesses in lamb production, it should not necessarily be inferred that during subsequent years a similar situation may prevail. Table 19 should be used in conjunction with table 18, and as time goes on data will be available covering a longer period, making it possible to form more definite conclusions.

TABLE 20

SLAUGHTER OF SHEEP AND LAMBS AT SAN FRANCISCO AND LOS ANGELES, 1921-1924
(Thousands, i.e., 000 omitted)

Month	1921		1922		1923		1924	
	San Francisco	Los Angeles	San Francisco	Los Angeles	San Francisco	Los Angeles	San Francisco	Los Angeles
January.....	68	35	85	51	68	47	53	52
February.....	62	32	65	42	59	40	57	49
March.....	74	41	72	48	83	51	69	48
April.....	91	39	81	53	86	47	101	30
May.....	96	41	90	43	88	50	141	129
June.....	83	45	80	45	77	51	79	104
July.....	85	45	77	45	73	50	71	57
August.....	90	50	84	47	76	51	69	50
September.....	87	49	76	43	70	47	69	50
October.....	89	46	83	43	76	50	73	46
November.....	75	48	70	39	66	50	62	49
December.....	94	46	63	41	60	48	67	52
Total.....	995	516	926	540	880	582	910	716

Source of data: U. S. Dept. Agr., Bur. Agr. Econ., San Francisco, Calif. W. E. Wofford, U. S. Dept. Agr., Bur. Agr. Econ., Los Angeles, Calif.

Number and Trend of Sheep Slaughtered in California.—Data on the slaughter of sheep and lambs at San Francisco and Los Angeles are available since 1921 (tables 20 and 21). In addition, information on state-inspected slaughter in other cities of California is now obtainable. An estimate of 10 per cent of the known slaughter has been placed on the uninspected slaughter in the state. Totals have been computed only since 1925, because records for state-inspected slaughter previous to the latter year were incomplete. Lambs slaughtered

for eastern markets are included in these totals, and the latter must be subtracted if information on the slaughter for consumption within the state is desired.

During the past three years the slaughter and consumption of sheep and lambs has been fairly constant, only a slight variation in totals occurring. Marketable increases have been sent east and as a result prices have remained at comparatively high levels on the local markets. The period for which complete slaughter data are available is far too limited a time on which to base accurate information relative to seasonal variation in slaughter. During the four months, March to June, when the bulk of the spring lambs come to market, slaughter is especially heavy. During these months an appreciable part of the dressed carcasses is sent east in express refrigerator cars (table 45). In table 21 the difference between the estimated slaughter and the estimated consumption represents the number of carcasses sent elsewhere for consumption. Beginning in October and continuing through February the kill is less than normal. California depends during this latter period on out-of-state supplies and fed lambs from the state to fill the demand.

The kill in the San Francisco Bay region increased from 640,991 head in 1915 to 995,000 in 1921. Since the latter date there has been a decrease.³⁰ This section accounted for from approximately 43 to 46 per cent of the state slaughter during the three years 1926-1928.

Slaughter at Los Angeles increased from 386,471 head in 1915 to 411,820 in 1920, and 516,316 in 1921. Unlike the slaughter at San Francisco, that at Los Angeles increased from 1921 to 1924. A drop was recorded for 1925 and there has been but little variation during the past three years. The kill in Los Angeles amounts to approximately 36 per cent of the state total.

Data on the slaughter of sheep and lambs under state inspection indicate that there has been a steady increase during the past four years. This may be attributed to the fact that more and more county slaughtering plants are being brought under state inspection. The carcasses may then be transported by truck to larger cities such as Los Angeles, San Francisco, and Oakland.

³⁰ It is believed by many familiar with local conditions that this decrease may be explained in the following manner: San Francisco is the center of spring-lamb production, and prior to the introduction of eastern lamb shipments, a considerable number of spring lambs were unloaded on that market. Many were sold on the consignment basis—the killers receiving a flat rate per head for slaughter and selling the carcasses for what could be obtained. At present there is no dumping, because the lambs are now sent east instead of to the San Francisco Bay region. Using wholesale prices of the daily press, it has been found that since 1920 prices for spring lambs have been relatively higher during the spring and early summer than previously.

TABLE 21

ESTIMATED TOTAL SLAUGHTER AND CONSUMPTION OF SHEEP AND LAMBS IN
CALIFORNIA, 1925-1929

	San Francisco District slaughter	Los Angeles District slaughter	State- inspected slaughter other than Los Angeles	Known slaughter, California	Estimated slaughter, California	Estimated consump- tion, California
1925						
January.....	59,160	48,802	10,972	118,934	131,000	131,000
February.....	51,310	44,289	8,098	103,697	114,000	114,000
March.....	65,618	52,445	9,305	127,368	140,000	126,000
April.....	81,296	73,462	14,777	169,535	186,000	156,000
May.....	69,764	76,585	13,436	159,785	176,000	146,000
June.....	66,031	50,992	12,979	130,002	143,000	141,000
July.....	66,929	50,104	14,023	131,056	144,000	144,000
August.....	66,022	47,397	10,343	123,762	136,000	136,000
September.....	71,138	47,620	12,947	131,705	145,000	145,000
October.....	65,116	45,802	10,468	121,386	134,000	134,000
November.....	54,098	41,015	9,385	104,498	115,000	115,000
December.....	58,737	43,544	9,133	111,414	123,000	123,000
Total.....	775,219	622,057	135,866	1,533,142	1,687,000	1,611,000
1926						
January.....	56,326	44,580	11,430	112,336	124,000	124,000
February.....	50,448	42,626	8,229	101,303	111,000	111,000
March.....	70,355	65,223	13,961	149,539	164,000	151,000
April.....	74,537	59,885	13,006	147,428	162,000	142,000
May.....	74,147	65,576	15,806	155,529	171,000	146,000
June.....	70,495	49,346	13,329	133,170	146,000	146,000
July.....	70,020	48,507	14,583	133,110	146,000	146,000
August.....	68,174	50,792	10,799	129,765	143,000	143,000
September.....	77,515	52,843	14,116	144,474	159,000	159,000
October.....	65,168	49,544	11,080	125,792	138,000	138,000
November.....	63,548	49,053	10,212	122,813	135,000	135,000
December.....	64,415	47,620	11,307	123,342	136,000	136,000
Total.....	805,148	625,595	147,858	1,578,601	1,735,000	1,677,000
1927						
January.....	63,409	49,778	9,022	122,209	134,000	134,000
February.....	55,091	46,080	7,674	108,845	120,000	120,000
March.....	71,539	54,804	9,290	135,633	149,000	144,000
April.....	77,340	65,163	14,911	157,414	173,000	143,000
May.....	76,273	61,375	15,708	153,356	169,000	148,000
June.....	66,829	52,648	11,258	130,735	144,000	144,000
July.....	66,013	48,583	9,837	124,433	137,000	137,000
August.....	68,745	51,196	12,964	132,905	146,000	146,000
September.....	69,223	51,009	11,932	132,164	145,000	145,000
October.....	63,406	49,593	12,383	125,382	138,000	138,000
November.....	60,163	46,304	12,237	118,704	131,000	131,000
December.....	52,043	45,918	7,851	105,812	116,000	116,000
Total.....	790,074	622,451	135,067	1,547,592	1,702,000	1,646,000

TABLE 21—(Concluded)

	San Francisco District slaughter	Los Angeles District slaughter	State-inspected slaughter other than Los Angeles	Known slaughter, California	Estimated slaughter, California	Estimated consumption, California
1928						
January.....	57,306	51,103	9,572	117,981	130,000	130,000
February.....	52,228	47,687	8,264	108,179	119,000	118,000
March.....	63,283	64,925	11,977	140,185	154,000	141,000
April.....	69,187	60,293	15,991	145,471	160,000	134,000
May.....	77,708	65,782	19,154	162,644	179,000	158,000
June.....	62,924	56,010	15,198	134,132	148,000	148,000
July.....	63,605	53,142	13,959	130,706	144,000	144,000
August.....	60,707	58,574	16,935	136,216	150,000	150,000
September.....	65,134	51,610	12,081	128,825	142,000	142,000
October.....	64,905	55,270	16,305	136,480	150,000	150,000
November.....	61,414	54,513	14,510	130,437	143,000	143,000
December.....	59,845	52,312	9,533	121,690	134,000	134,000
Total.....	758,246	671,221	163,479	1,592,946	1,753,000	1,692,000
1929						
January.....	55,593	60,168	11,469	127,230	140,000	140,000
February.....	47,392	50,387	8,075	105,854	116,000	116,000
March.....	56,963	67,330	11,870	136,163	150,000	137,000
April.....	67,350	68,082	14,665	150,097	165,000	142,000
May.....	73,192	66,864	24,035	164,091	181,000	158,000
June.....	58,173	57,441	17,120	132,734	146,000	146,000
July.....	62,292	63,143	20,710	146,145	161,000	161,000
August.....						
September.....						
October.....						
November.....						
December.....						
Total.....						

Source of data: Calif. Wool Growers Assoc., San Francisco, Calif.

Age Classification of Sheep Slaughtered in California.—In San Francisco there are approximately ten wholesale slaughterers operating under regulations of the city health board which require that inspectors maintain records showing the number of sheep killed per week as distinct from the slaughter of lambs. The animals which do not show a 'break joint' are classified as sheep and those which do, as lambs (p. 54). Practically all of the mature mutton carcasses go to institutions, steamship lines, etc., relatively few reaching the retail trade of the San Francisco Bay district. Both the Chinese³¹ and Greek trade in the larger centers of population prefer mutton to lamb, the higher price of lamb being the controlling factor.

³¹ Davis, W. C. Methods and practices of retailing meat. U. S. Dept. Agr. Dept. Bul. 1441:6-7. 1926.

The summary of slaughter by certain San Francisco Bay district killers can be considered a representative cross-section of the markets at both San Francisco and Los Angeles (table 22). Records are not available over a sufficiently long period to indicate a pronounced seasonal variation in the slaughter of sheep. From the meager data on hand indications point to smaller amounts of mutton available as the lambing season approaches, as ewes are most plentiful during June, July, August, and September after the lambs have been weaned and sent to market. The proportion of available wethers is so small that quotations on two-year-olds have been discontinued at most live-

TABLE 22

PERCENTAGE OF MATURE MUTTON IN TOTAL SHEEP SLAUGHTER,*

SAN FRANCISCO, 1926-1928

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
1926.....	6.81	6.87	2.25	3.01	6.51	4.49	8.46	8.36	7.12	5.46	6.86	7.02	6.18
1927.....	4.09	2.95	2.83	4.02	3.72	5.09	5.19	5.59	6.64	5.91	6.09	7.42	4.94
1928.....	6.81	4.00	3.30	2.74	6.03	3.86	7.49	6.18	6.25	7.02	5.42	5.57	5.36

* Based on total slaughter of slaughterers reporting to the San Francisco Board of Health. In 1926 the total was 398,560; 1927—406,927; 1928—385,174.

Source of data: San Francisco Board of Health.

stock markets. In all probability, approximately 5 per cent of the total slaughter of sheep and lambs is sufficient to take care of the limited trade demands of the various groups mentioned above.

In the average retail shop the product offered is lamb. In marked contrast to the large supply of lamb offered during recent years, it is significant that almost universal testimony has been supplied by many old-time buyers of sheep and lambs that prior to 1904 very few lambs were slaughtered, the bulk being yearling wethers, ewes, and mature animals.

MUTTON AND LAMB CONSUMPTION

United States.—Data on the estimated annual consumption of meats are available since 1900 (table 23). Estimates of the output of meat from federally inspected slaughter plants can be relied upon. On account of the difficulties surrounding the estimation of uninspected slaughter (p. 40) total consumption data are apt to contain a considerable percentage of error. Contrary to popular belief, there has been but little change in the total per-capita consumption of all meats during the past twenty-nine years. The per-capita consump-

tion of meat is apparently in the neighborhood of 140-150 pounds a year. In considering this meat ration the utilization of eggs and poultry in large quantities must be taken into account, for the figure quoted does not include eggs and poultry. The country has, therefore, a heavy meat intake, despite expansion in use of fruits and vegetables in recent years.

TABLE 23
ESTIMATED ANNUAL PER-CAPITA CONSUMPTION OF MEAT AND LARD IN THE
UNITED STATES, 1900-1928
(Pounds per capita)

Year	Lamb and mutton	Beef	Veal	Pork, not including lard	Total meat*	Lard	Total meats and lard
1900.....	6.8	67.8	3.5	64.7	142.8	13.2	156.0
1901.....	6.9	69.0	3.9	63.0	142.8	12.9	155.7
1902.....	7.0	68.5	4.4	57.8	137.7	11.7	149.4
1903.....	7.2	76.0	4.7	59.3	147.2	11.8	159.0
1904.....	6.8	73.6	5.1	62.8	148.3	12.4	160.7
1905.....	6.5	73.0	5.4	58.8	143.7	10.0	153.7
1906.....	6.5	72.6	5.4	59.7	144.2	11.2	155.4
1907.....	6.4	77.5	6.7	64.4	155.1	13.5	168.6
1908.....	6.3	71.5	6.4	66.1	150.3	13.5	163.5
1909.....	6.6	75.4	6.9	60.1	149.2	11.5	160.7
1910.....	6.4	71.1	6.8	57.1	141.6	11.4	153.0
1911.....	7.8	67.7	6.4	64.5	146.5	11.3	157.8
1912.....	8.1	61.1	6.3	61.8	137.4	11.2	148.6
1913.....	7.5	60.6	5.1	63.0	136.3	11.4	147.7
1914.....	7.4	58.5	4.6	62.3	133.0	12.2	145.2
1915.....	6.3	54.5	4.3	59.5	124.8	12.9	137.7
1916.....	6.1	56.0	5.3	60.1	127.7	13.6	141.3
1917.....	4.6	59.5	6.5	49.3	120.1	11.7	131.8
1918.....	4.7	63.0	7.4	54.8	130.1	13.3	143.4
1919.....	5.8	61.6	7.7	54.8	130.0	12.3	142.3
1920.....	5.5	63.1	7.6	60.5	136.8	13.3	150.1
1921.....	5.9	56.9	7.0	63.5	133.3	11.3	144.6
1922.....	5.0	60.4	7.3	66.1	138.8	14.2	153.0
1923.....	5.2	61.4	7.7	74.7	149.0	15.3	164.3
1924.....	5.2	61.6	8.2	74.7	149.7	15.4	165.1
1925.....	5.2	62.2	8.7	67.6	143.7	13.2	136.9
1926.....	5.5	63.6	8.2	65.7	143.0	13.5	156.5
1927.....	5.4	58.4	7.4	68.5	139.7	13.8	153.5
1928.....	5.6	51.7	6.8	73.9	138.0	14.7	152.7

* Includes a relatively very small quantity of goat meat which is not given separately.

Source of data: Roberts, John. Meat production, consumption, and foreign trade in the United States, calendar years 1900-1928. U. S. Dept. Agr., Bur. Anim. Indus. Mimeographed Circular, pp. 1-9, 1929.

Of this per-capita meat consumption, mutton and lamb contribute between 5 and 6 pounds. There has been a distinct decline in the estimated per-capita consumption of mutton and lamb since the beginning of the century. Before the War consumption was between 6 and 8 pounds. Conclusions drawn from a comparison of isolated years or even from a series of years are oftentimes erroneous unless the corresponding phase of the production cycle is considered. Went-

worth and Clemen³² have made a long-time estimate of the per-capita consumption of mutton and lamb by decades since 1830–1839. This indicates a gradual downward tendency.

Since 1900, there have been four more or less well-defined movements in the consumption of mutton and lamb. From 1903 to 1907 there was a gradual decline; from 1907 to 1912 there was a rise to a peak, the estimated consumption reaching 8.1 pounds; during the period 1912–1917 there was a considerable falling off in consumption; and since the latter date there has been a small increase. It will be noted that since 1922 the trend in consumption has been slowly upward, and that during this time the sheep cycle has been in its expansion phase.

Since 1900, beef, mutton, and lamb have apparently been occupying places of lesser importance in the meat diet of the American people, while pork and veal have been increasing in importance. While data are not available, it is highly probable that the decrease in the combined per-capita consumption of mutton and lamb has been brought about largely by a decrease in the consumption of mutton. In 1928, the national consumption of meat is estimated to have amounted to 16,569,000,000 pounds (138.0 pounds per capita). Of this 673,000,000 pounds was lamb and mutton (4.1 per cent), 7,032,000,000 beef and veal (42.4 per cent), and 8,863,000,000 pork, not including lard (53.5 per cent).

The production and consumption of mutton and lamb is smaller than that of beef, pork, or veal. Pearl in studies on the food supply of the United States³³ has estimated that during the period 1911–12 to 1915–17 (fiscal years) mutton and lamb, together with their offal, contributed 1.01 per cent of the protein, 1.25 per cent of the fat and 0.61 per cent of the total energy (in calories) in the average annual production of all foodstuffs (available for human food) produced in the United States. Data on foodstuffs consumed in the United States indicate that in the six years 1911–12 to 1916–17, 1.20 per cent of the protein, 1.28 per cent of the fat and 0.61 per cent of the total energy were contained in mutton and lamb. It was toward the end of this period that a pronounced drop occurred. Pearl estimates the 1917–18 protein, fat, and energy provided by lamb and mutton to be 0.75 per cent, 0.86 per cent and 0.40 per cent respectively.

³² Wentworth, Edward N., and R. A. Clemen. Long trend meat consumption. Armour's Livestock Bureau. Monthly Letter to Animal Husbandmen 7(4):1. 1926.

³³ Pearl, Raymond. The nation's food. 274 p. W. B. Saunders Co., Philadelphia. 1920.

Regional Consumption.—From estimates made by both the United States Department of Labor³⁴ and the United States Department of Agriculture (table 24) it appears that the consumption of lamb and mutton varies more by sections than either that of beef or pork.

The per-capita consumption of mutton and lamb is larger in the western and north Atlantic states than in any other sections of the United States. Per-capita consumption in both the southern and middle western states is relatively low. Estimates made by the authors confirm the information with reference to the high per-capita consumption of mutton and lamb on the Pacific Coast. The estimate for the per-capita mutton and lamb consumption in California in 1926 was 13.3 pounds. Leaving out of consideration the western states, the north Atlantic states probably consume nearly 75 per cent of the mutton and lamb slaughtered under federal inspection in the remainder of the United States. The New York City area is estimated to consume 20 to 25 per cent of the total inspected slaughter in the United States.³⁵

The Commercial Research Department of Swift and Company in 1922 estimated that approximately 75 per cent of the sheep in the country were raised west of the Mississippi,³⁶ while approximately 70 per cent of the mutton and lamb is consumed east of it.³⁷ The problem of transportation in the sheep business is a vital one.

Consumer's preference studies³⁸ on meats in twelve cities of the country also help to substantiate the statements made with reference to consumption by sections. In San Francisco households, lamb was preferred to a larger extent than in the remaining eleven cities.

The urban demand for lamb and mutton is almost 50 per cent greater than that from rural sections except in the western sections of the country (table 24). It is highly probable that the growth of cities in the United States has greatly increased the demand for lamb. The average city dweller prefers small cuts of meat. Lambs furnish cuts which fit in admirably with this scheme.

³⁴ U. S. Dept. Labor, Bur. Labor Statistics. Retail prices 1890 to 1925. U. S. Bur. Labor Statistics. Bul. 418:4. 1926.

³⁵ Letter from C. H. Harlan, Livestock Statistician, Division of Crop and Livestock Estimates, Bur. Agr. Econ., Washington, D.C.

³⁶ From the estimated lamb crop of the United States for 1926-1928, the authors have calculated that approximately 80.6 per cent of the lambs were produced west of the Mississippi during those years.

³⁷ Swift and Co. Commercial Research Dept. Studies in livestock marketing. The geography of meat production and consumption. 4 p. Jan., 1922.

³⁸ Gardner, Kelsey B., and Laurence A. Adams. Consumer habits and preferences in the purchase and consumption of meat. U. S. Dept. Agr. Dept. Bul. 1443:1-64. 1926.

The characteristic of the present-day consumption of slaughter-house meat is the preference for younger animals, lighter and leaner carcasses, and smaller cuts. This is the result, in part, of the limitations of the modern kitchen, of the preference for broiled meats rather than roasted meats, and of the disfavor into which boiled and sautéed

TABLE 24
ESTIMATED PER-CAPITA MEAT CONSUMPTION BY REGIONS, 1919

	Total	Mutton and lamb	Beef	Veal	Pork
<i>Urban</i>					
North Atlantic.....	129.9	10.9	64.0	13.5	61.5
North Central, east.....	154.0	7.3	75.6	11.6	69.3
North Central, west.....	163.2	11.7	77.5	6.9	67.2
South Atlantic.....	142.4	5.4	55.1	5.7	76.3
South Central.....	158.9	8.7	66.1	4.4	79.7
Western.....	166.6	13.6	76.2	16.3	60.5
Average.....	155.8	9.3	68.3	11.8	66.3
<i>Rural</i>					
North Atlantic.....	150.8	7.6	47.1	10.7	85.5
North Central, east.....	171.1	5.8	48.3	7.2	109.9
North Central, west.....	180.7	3.8	57.4	6.3	113.1
South Atlantic.....	153.7	4.4	28.5	3.2	117.6
South Central.....	158.5	6.9	28.6	1.7	121.3
Western.....	171.3	15.8	64.7	9.3	81.5
Average.....	163.2	6.5	41.6	5.4	109.7
<i>Total population</i>					
North Atlantic.....	150.1	10.0	59.6	12.8	67.7
North Central, east.....	167.3	6.6	62.7	9.5	88.5
North Central, west.....	174.9	4.8	64.1	8.1	97.8
South Atlantic.....	150.9	4.7	35.2	3.8	107.1
South Central.....	158.6	7.3	36.3	2.3	112.8
Western.....	169.0	14.7	70.3	12.7	71.3
Average.....	159.7	7.8	54.0	8.4	89.6

Source of data: U. S. Dept. Agr. Sectional meat consumption in the United States. U. S. Dept. Agr. Yearbook 1920: 828. 1921.

meats have fallen. This trend expresses itself in preference for lamb, baby beef, young pork, and broiler poultry.³⁹

California.—Some indication of mutton and lamb consumption in California can be obtained from data on the estimated number of sheep and lambs slaughtered and consumed in the state (table 21). These figures show but little variation for the three years 1926–1928. The data show that the average consumption for the seven months

³⁹ Address by Dr. Alonzo Taylor, Director, Food Research Institute, Stanford University, given before the 21st Annual Convention of the California Wool Growers Association, San Francisco, Nov. 17, 1928.

beginning in March is appreciably larger than that during the remainder of the year (table 21), and that the five months from October to February are those of less than normal consumption. During a portion of this latter period poultry and in all probability pork are substituted for other meats. Supplies of lamb must be sent into the state in large quantities from September to February (table 51).

From slaughter data at San Francisco and Los Angeles it is evident that the per-capita consumption in the Bay city area exceeds that in the southern section of the state. Annual consumption in the San Francisco Bay area approximates 800,000 head, or almost two-thirds of a lamb per person, which is roughly from 20 to 24 pounds, or between four and five times the estimated per-capita consumption for the entire country.

Not a few retailers testify that between 25 and 30 per cent of their retail meat business consists of lamb. Various reasons have been assigned by members of the wholesale meat trade of San Francisco for this above-average trade in lamb. Many wholesalers state that the fact that they deliver carcasses of lamb to the retail shops in separate trucks is conducive to enlarged demand, because the carcasses are not injured in transportation. Approximately 80 per cent of the carcass retail trade in the Bay district is restricted to firms who do not handle the carcasses in and out of refrigerator cars. Boxes, barrels, and packages of meat are not loaded with carcass goods. One or two exclusive lamb slaughterers do not handle pork, beef, veal, or any other packing-house products.

Another factor contributing to a large consumption is the apparently lower retail price for lamb prevailing in San Francisco (compare tables 39 and 40). The moderate climate is perhaps partly responsible for this larger consumption.

One of the main reasons for a wide outlet for lamb in the San Francisco district is the fact that packers and slaughterers have access to large numbers of lambs the year round. There is a succession of 'spring-lamb' crops within a shipping radius of San Francisco from March 15 to September 15, and during the remainder of the year fed lambs of good quality are available, many Bay district packers operating their own feed lots during the winter months in order to keep up the quality of their product.

Increased Consumption of Lamb.—If the sheep population of the country continues to grow, the problem of greater consumption will present itself. Those interested in increasing the present consumption of lamb should realize that the problem is most difficult. Dr. Alonzo

Taylor states that the per-capita consumption of food (in calories) in the United States has been declining and that the end of the decline has not yet been reached. The main reasons given for this movement are: (1) substitution of machines for manual labor, (2) vogue for slimness, and (3) better heating of homes.⁴⁰ If lamb consumption is increased, lamb will take the place of some other food. This augmentation of lamb consumption can only be brought about by the offering of high-quality lamb of uniform grade.

The inauguration of educational campaigns regarding the use of lamb ought to have favorable results. Until recently legs and chops have been the only two cuts of lamb widely utilized. A greater demand for other parts of the carcass should be instrumental in lowering the present retail price on the two cuts mentioned, without affecting either the wholesale carcass price or the price paid to the producer. On account of the low consumption of lamb in the middle west it would appear that the population might be induced to include high-quality lamb in the diet.

There still seems to be doubt in the mind of the consuming public as to whether a carcass is lamb or mutton.⁴¹ If the consumer could be assured that the purchase made is lamb, sales might be increased. Lamb is a general term which refers to the flesh of young animals of the ovine species of both sexes. The age at which the change from lamb to yearling sheep takes place in the live animal is approximately twelve to fourteen months (see p. 68). Lamb carcasses as a group are distinguished from mutton carcasses by their smaller and softer bones, lighter-colored flesh, softer and whiter external and internal fats, smaller size of carcass and cuts, and by the break joint of the forelegs. Lamb foreleg joints break in four well-defined ridges, resembling somewhat the teeth of a saw. These ridges are smooth, moist, and red with blood. As lambs approach the yearling stage the bones become harder, whiter, and more porous, and there is only a slight indication of blood at the joint. When an animal has passed through the yearling stage and has become sheep, the cartilage becomes ossified or hardened and the knuckle no longer breaks off the end of the bone. This is a hard, smooth, white shiny surface with two prominent ridges.⁴²

⁴⁰ Address by Dr. Alonzo Taylor, Director, Food Research Institute, Stanford University, given before the 21st Annual Convention of the California Wool Growers Association, San Francisco, Calif., Nov. 17, 1928.

⁴¹ Discussion, California Wool Growers Association Convention, Palace Hotel, San Francisco, Nov. 17, 1928.

⁴² Davis, W. C., and J. A. Burgess. Market classes and grades of dressed lamb and mutton. U. S. Dept. Agr. Dept. Bul. 1470:6. 1927.

The Division of Livestock, Meats, and Wool of the Bureau of Agricultural Economics has been attempting to grade and stamp beef carcasses in order to supply evidence of the true grade in such manner that it will be easily distinguished by everyone, including the individual consumer.⁴³ This work has not been inaugurated with mutton and lamb carcasses except in a minor way, such as carcasses consigned to institutions. The adoption of this system might serve to stimulate the consumption of lamb by overcoming the doubt in the mind of the consumer relative to the quality of the meat purchased.

TABLE 25
ESTIMATED PER-CAPITA CONSUMPTION OF MUTTON AND LAMB IN CERTAIN
COUNTRIES, PRE-WAR, ANNUAL, 1921-1928
(Pounds)

Year	United States	Canada	Argentina	United Kingdom	Denmark	Belgium	France	Germany	Australia	New Zealand
Pre-War	7.3	9.1	32.2	29.3	8.2	2.0	9.5	2.3	97.5	
1921	5.9	11.4	38.7	26.9	1.2	6.8	2.1	66.1	} 82*
1922	5.0	9.8	29.1	26.5	.....	1.2	6.8	1.9	86.1
1923	5.2	8.6	23.4	24.9	.....	0.7	7.2	1.2	78.3
1924	5.2	5.2	15.7	22.1	.....	0.9	7.0	1.8	59.9
1925	5.2	5.0	15.8	23.9	.....	1.2	6.6	2.0	54.7
1926	5.5	6.0	19.6	25.0	.....	1.1	7.8	1.8	64.1
1927	5.4	6.1	20.2	24.9	.....	1.3	6.6	1.6	71.6
1928	5.6	6.5	21.2	25.1	.....	.....	6.8	1.6	.....

* Average per capita consumption for 10-year period ending with 1928.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Estimated per-capita consumption of beef, mutton, and pork in specific countries. Foreign Crops and Markets 19 (3): 95-97. 1929.

Consumption in other Countries.—In the countries for which data are available consumption of mutton and lamb has been far lower in the seven years, 1921-1927 (table 25), than during the pre-war period. The general tendency in 1928 in most countries for which per-capita consumption estimates have been made was to consume more sheep-meat and pork and less beef per capita. The exceptions are the United Kingdom, France, and Germany. While the eight-year period is too short to detect a definite trend, indications point to a lessening of mutton and lamb consumption. The Bureau of Agricultural Economics of the United States Department of Agriculture reports that this decrease has been offset by an augmentation of the per-capita consumption of beef and pork. The per-capita consumption of mutton and lamb is greater in New Zealand, Australia, Argentina, and the United Kingdom than in other countries. With the exception of the latter, all are surplus sheep areas and comparatively younger countries.

⁴³ An excellent account of this work, which was inaugurated on May 2, 1927, will be found in: National Livestock and Meat Board. Grading and stamping prime and choice beef carcasses. National Livestock and Meat Board Bul. 1:1-15. Chicago, Ill. 1927.

PURCHASING POWER OF SHEEP, UNITED STATES AND CALIFORNIA,
JANUARY 1, 1869-1929

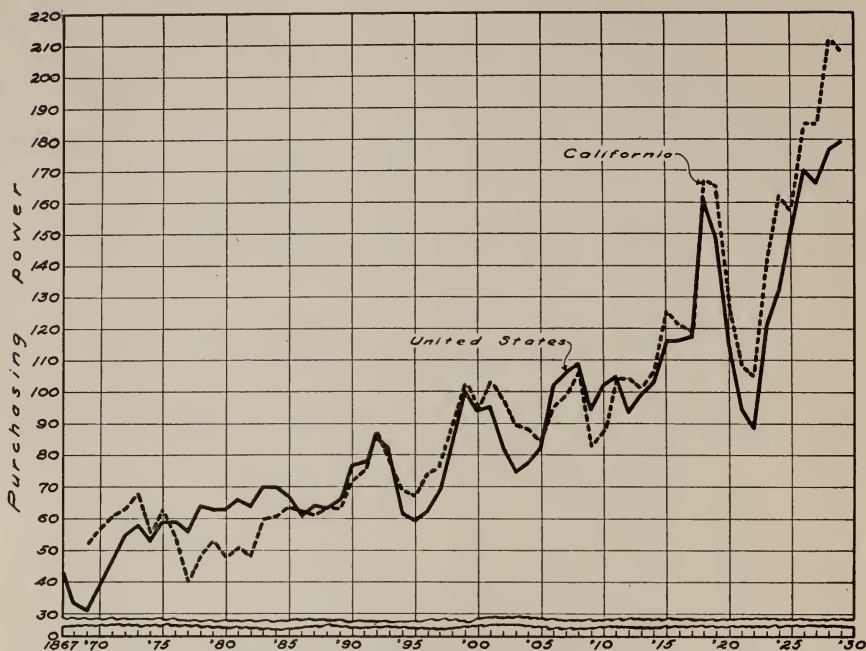


Fig. 16.—The purchasing power of sheep on January 1 of each year in the United States and in California shows a fairly definite cyclical movement, not, however, as distinct as that of cattle. While the peaks and depressions of the cycles for the nation and state do not absolutely correspond, there is a high degree of correlation between the two. If the future can be interpreted from the past, values should decline for the next two or three years. High values of cattle will perhaps exert some tendency to hold sheep prices high. In the past, high inventory values have been reached in the United States in 1892, 1899, 1908, 1911, 1918, and 1929, while low values occurred in 1895, 1903, 1909, 1912, 1922. (Data from table 26.)

PRICES AND PURCHASING POWER OF SHEEP AND LAMBS

Owing to the divergent interests of those to whom this publication may be of value, and to the uses for which the various data are submitted, several series of price and value data are given. With these varying purposes in view, price and value series are given for (1) annual inventory values of the United States Department of Agriculture, (2) prices paid producers for sheep and lambs in the United States and California, (3) wholesale quotations on lambs at San Francisco and Los Angeles.

1. *Annual Inventory Values of the United States Department of Agriculture.*—Since 1869, yearly estimates on the valuation of sheep in both the United States and California have been made on January

first by the United States Department of Agriculture (fig. 16). These estimates represent inventory values but not sales. While studies with reference to the trends and cycles in sheep values should be helpful to sheepmen in preparing for future operations, such statistical information does not enable one to see the future in an absolute manner. The data relative to cycles of sheep values simply indicate what has happened in the past. In these inventory studies January first values have been expressed in terms of purchasing power (table 26). An analysis of these values indicates that fairly regular cycles in purchasing power have occurred. The New York State College of Agriculture⁴⁴ and Armour's Livestock Bureau⁴⁵ in independent researches have come to the same conclusions. The purchasing power of sheep compared with all commodities has shown a general upward trend with considerable irregularity. The peaks in the January first valuations of sheep have been 1874, 1883, 1892, 1899, 1908, 1917, and 1929 (fig. 16). The period from peak to peak has been from eight to twelve years. Low points have occurred in 1869, 1880, 1886, 1895, 1903, 1912, and 1922. The period between the low points has been less regular than that between high points. These cyclical movements are not absolutely uniform and even if history were to repeat itself the exact number of years in the cycle could not be foretold. Nevertheless, these cycles should prove to be of interest to sheepmen. If present values (Jan. 1, 1929) were to continue, a very great expansion might be justified. The purchase of sheep at present prices with high land rentals and labor costs makes such an expansion highly speculative. On January 1, 1929, sheep, in the United States, had a higher value in terms of purchasing power than they have had since 1918. All indications point to the present (1929) as being the peak of the purchasing-power cycle. It is of interest to note that in purchasing power, values have tended upward since 1869 (fig. 16). It is highly probable that when values go lower they will not go so low as they did in the previous depression phase of the cycle. Continued high values during the past few years have been largely the result of an increased demand for lamb.

Calculations of California data show a fairly close agreement with those for the United States (fig. 16). It should be noted that values

⁴⁴ Warren, G. F., and F. A. Pearson. Periods of over and under-production of sheep. New York State College of Agriculture. *Farm Economics* 1(22):249-250. 1925.

⁴⁵ Wentworth, Edward N., and Tage U. Ellinger. Cyclical trends in the sheep industry. *Monthly Letter to Animal Husbandmen* 5(12):1-4. 1925.

TABLE 26

ACTUAL AND RELATIVE VALUES, PURCHASING POWER OF SHEEP, CALIFORNIA AND UNITED STATES, JANUARY 1, 1869-1929

Year	All-commodity index on Jan. 1	California			United States		
		Actual value (dollars per head)	Relative value	Relative purchasing power	Actual value (dollars per head)	Relative value	Relative purchasing power
	1	2	3	4	5	6	7
1869.....	135	2.53	70	52	1.64	42	31
1870.....	125	2.56	71	57	1.90	49	39
1871.....	119	2.59	72	61	2.14	55	46
1872.....	122	2.78	77	63	2.61	67	55
1873.....	121	2.97	83	68	2.71	70	58
1874.....	117	2.31	64	55	2.43	62	53
1875.....	112	2.53	70	63	2.55	66	59
1876.....	104	2.02	56	54	2.37	61	59
1877.....	97	1.40	39	40	2.13	55	57
1878.....	89	1.52	42	47	2.21	57	64
1879.....	85	1.61	45	53	2.07	53	63
1880.....	94	1.62	45	48	2.29	59	63
1881.....	93	1.70	47	51	2.39	61	66
1882.....	95	1.65	46	48	2.37	61	64
1883.....	93	2.02	56	60	2.53	65	70
1884.....	87	1.90	53	61	2.37	61	70
1885.....	82	1.89	53	64	2.14	55	67
1886.....	81	1.81	50	62	1.91	49	61
1887.....	81	1.77	49	61	2.01	52	64
1888.....	83	1.88	52	63	2.05	53	64
1889.....	83	1.88	52	63	2.13	55	66
1890.....	80	2.08	58	72	2.41	62	77
1891.....	82	2.20	61	75	2.50	64	78
1892.....	77	2.42	67	87	2.58	66	86
1893.....	83	2.32	65	78	2.66	68	82
1894.....	73	1.81	50	69	1.98	51	61
1895.....	69	1.65	46	67	1.58	41	59
1896.....	70	1.85	51	74	1.70	44	62
1897.....	68	1.86	52	76	1.82	47	69
1898.....	70	2.23	62	89	2.46	63	90
1899.....	71	2.64	73	103	2.75	71	100
1900.....	83	2.85	79	95	2.93	75	91
1901.....	81	3.00	83	103	2.98	77	95
1902.....	83	2.90	81	97	2.65	68	82
1903.....	91	2.92	81	89	2.63	68	74
1904.....	87	2.75	76	88	2.59	67	77
1905.....	88	2.67	74	84	2.82	72	82
1906.....	89	3.03	84	95	3.54	91	102
1907.....	93	3.30	92	99	3.84	99	106
1908.....	91	3.47	96	106	3.88	100	110
1909.....	94	2.80	78	83	3.43	88	94
1910.....	104	3.30	92	88	4.12	106	102
1911.....	96	3.59	100	104	3.91	101	105
1912.....	96	3.60	100	104	3.46	89	93
1913.....	102	3.70	103	101	3.94	101	99
1914.....	100	3.80	106	106	4.02	103	103

TABLE 26—(Concluded)

Year	All-commodity index on Jan. 1	California			United States		
		Actual value (dollars per head)	Relative value	Relative purchasing power	Actual value (dollars per head)	Relative value	Relative purchasing power
	1	2	3	4	5	6	7
1915.....	100	4.50	125	125	4.50	116	116
1916.....	115	5.00	139	121	5.17	133	116
1917.....	156	6.70	186	119	7.13	183	118
1918.....	188	11.30	314	167	11.82	304	162
1919.....	202	12.00	333	165	11.63	299	148
1920.....	237	10.90	303	128	10.46	269	115
1921.....	173	6.70	186	108	6.28	161	93
1922.....	141	5.30	147	105	4.80	123	88
1923.....	159	8.10	225	142	7.53	194	122
1924.....	154	9.00	250	162	7.91	203	132
1925.....	163	9.20	256	157	9.70	249	153
1926.....	159	10.60	294	185	10.51	270	170
1927.....	150	10.00	278	185	9.71	250	166
1928.....	149	11.40	317	213	10.25	263	177
1929.....	152	10.80	300	197	10.60	272	179

Sources of data: Col. 1—U. S. Bur. Labor Statis. All-commodity wholesale-price index for the United States. Base 1910-1914=100. Col. 2—1869-1927, California Cooperative Crop Reporting Service; January 1 farm values of California livestock per head 1869-1928. California Crop Rpt. 1927: 62. 1928. 1928-1929, California Cooperative Crop Reporting Service. Summary of California annual livestock report. Mimeographed report issued Feb. 6, 1929. Col. 3—Relatives of items in col. 2. 1910-1914=3.60=100. Col. 4—Items in col. 3 divided by the index number for the month of January of the year in col. 1. Col. 5—1869-1893, U. S. Dept. Agr. Sheep: farm price per head. Yearbook 1922: 867. 1923. 1894-1929, U. S. Dept. Agr. Farm price of sheep per head. Crops and Markets 6 (2): 41. 1929. Col. 6—Relatives of items in col. 5. 1910-1914=3.89=100. Col. 7—Items in col. 6 divided by the index number for the corresponding year in col. 1.

on January 1, 1929, were lower than on the same date a year previous. In both the state and nation sheep values apparently increase over a period of from four to five years and then retrograde.

2. *Farm Prices of Sheep and Lambs in the United States and California.*—The value per head of sheep and lambs varies with condition, quality, age, size, and weight. In addition, the covering of wool affects the price. In tables 27 to 30 prices are given per hundred pounds liveweight instead of per head, as the former prices are far less variable than the latter.⁴⁶

These data can be used in a general way to indicate trends (fig. 17). Compared with the wholesale prices of all commodities on a 1910-1914 base, the purchasing power of sheep rose to a peak in 1918. After a decline which reached a low point in 1921, the purchasing power has improved steadily, and during the past four years, 1925-1928, it has been over 100 per cent (table 31). Data for California (table 31) show a similar trend.

⁴⁶ Sarle, Charles F. Reliability and adequacy of farm-price data. U. S. Dept. Agr. Dept. Bul. 1480:1-65. 1927.

TABLE 27
MONTHLY FARM PRICES OF SHEEP, UNITED STATES, 1910-1929
(Dollars per 100 pounds)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted* average
1910	5.63	5.09	5.64	6.10	5.79	5.44	5.47	4.68	4.81	4.68	4.63	4.54	5.24
1911	4.47	4.34	4.45	4.55	4.51	4.24	4.19	3.98	3.91	3.68	3.65	3.71	4.16
1912	3.89	4.01	4.12	4.57	4.74	4.52	4.21	4.26	4.11	4.19	4.05	4.21	4.24
1913	4.35	4.63	4.97	5.16	4.91	4.84	4.20	4.32	4.23	4.16	4.27	4.46	4.85
1914	4.67	4.67	4.77	4.96	4.87	4.70	4.75	4.87	4.80	4.81	4.68	4.95	4.79
1915	4.95	5.14	5.36	5.60	5.54	5.43	5.35	5.16	5.06	5.18	5.18	5.38	5.27
1916	5.52	5.90	6.35	6.61	6.66	6.54	6.33	6.22	6.25	6.20	6.41	6.77	6.29
1917	7.33	8.17	9.21	9.69	10.15	9.84	9.32	9.33	10.05	10.24	10.44	10.44	9.45
1918	10.55	10.75	11.41	11.98	12.32	11.56	11.04	10.99	10.79	10.35	10.11	9.46	10.95
1919	9.68	9.95	10.45	11.33	10.93	10.34	9.25	9.06	8.69	8.46	8.35	8.53	9.63
1920	9.34	9.97	10.25	10.66	10.34	9.13	8.21	7.54	7.24	6.62	6.20	5.54	8.51
1921	5.30	5.01	5.27	5.11	5.11	4.74	4.34	4.38	4.11	3.96	3.84	4.10	4.65
1922	4.57	5.71	6.51	6.43	6.65	6.09	6.11	5.98	5.70	5.93	6.02	6.27	5.96
1923	6.88	6.83	7.06	7.20	6.92	6.43	6.43	6.22	6.57	6.33	6.20	6.39	6.65
1924	6.71	6.82	7.22	7.45	7.33	7.09	6.60	6.32	6.30	6.32	6.39	6.84	6.81
1925	7.86	8.41	8.20	8.42	7.53	7.04	7.17	7.32	7.27	7.31	7.51	7.79	7.70
1926	7.95	8.20	7.66	7.67	7.78	7.56	7.09	6.92	7.13	6.93	6.75	6.95	7.43
1927	6.87	7.16	7.41	7.40	7.68	7.27	7.16	7.13	7.06	7.05	7.42	7.38	7.26
1928	7.52	7.60	7.85	8.11	8.09	7.84	7.56	7.53	7.58	7.50	7.50	7.29	7.68
1929	7.84	7.98	8.36	8.40	8.09	7.86	7.25	7.32					

* Weighted average computed with following weights—Jan., 12; Feb., 9; Mar., 7; Apr., 9; May, 12; June, 6; July, 5; Aug., 6; Sept., 7; Oct., 9; Nov., 10; Dec., 8.
Source of data: U. S. Dept. Agr. Monthly farm prices of sheep, 1910-1928. Crops and Markets 6 (2): 42. 1929. Current data in monthly issues of Crops and Markets.

TABLE 28
MONTHLY FARM PRICES OF LAMBS, UNITED STATES, 1910-1929
(Dollars per 100 pounds)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted* average
1910	5.82	6.62	7.37	7.47	7.26	7.13	6.71	5.70	5.85	5.78	5.54	5.60	6.40
1911	5.71	5.44	5.49	5.77	5.74	5.51	5.42	5.25	5.02	4.68	4.68	4.93	5.29
1912	5.22	5.15	5.38	5.98	6.16	6.02	5.74	5.70	5.49	5.42	5.37	5.70	5.61
1913	6.03	6.34	6.56	6.59	6.66	6.36	6.05	5.50	5.51	5.51	5.64	5.85	6.06
1914	6.16	6.18	6.31	6.47	6.49	6.47	6.55	6.26	6.27	6.09	6.14	6.33	6.32
1915	6.47	6.67	6.06	7.35	7.32	7.26	7.21	6.70	6.71	6.70	6.76	7.02	6.86
1916	7.29	7.78	8.10	8.58	8.49	8.36	8.16	8.15	8.22	8.02	8.41	8.72	8.22
1917	9.59	10.51	11.46	12.03	12.51	12.64	11.19	12.08	13.06	14.09	13.79	13.81	12.31
1918	13.83	13.77	14.11	15.34	15.39	14.98	14.20	14.20	13.73	13.20	12.54	12.44	13.93
1919	12.71	13.17	14.03	14.61	14.34	13.89	13.09	12.91	12.25	11.47	11.45	11.85	12.96
1920	12.91	14.08	14.17	14.63	14.26	12.82	11.79	10.84	10.31	9.65	9.37	8.46	11.85
1921	8.44	7.76	7.90	7.55	7.78	7.59	7.37	6.99	6.27	5.98	6.12	6.60	7.19
1922	7.33	8.87	10.21	10.54	10.39	9.87	9.55	9.39	9.43	10.06	10.30	10.49	9.76
1923	10.69	10.83	11.01	10.69	11.00	10.72	10.60	9.96	10.28	10.17	10.01	10.10	10.50
1924	10.19	10.53	11.22	11.32	11.43	11.21	10.50	10.15	10.18	10.35	10.55	10.96	10.75
1925	12.69	13.13	13.48	12.22	11.99	11.62	11.71	11.80	11.95	12.04	12.20	12.67	12.30
1926	12.79	12.02	11.56	11.32	11.78	12.07	11.52	11.12	11.32	11.31	11.11	10.92	11.56
1927	10.65	10.84	11.55	11.97	11.92	11.95	11.44	11.15	11.14	11.22	11.42	11.39	11.41
1928	11.34	11.90	12.31	12.73	13.03	13.18	12.25	11.88	11.97	11.57	11.50	11.41	12.09
1929	12.23	12.60	13.12	13.36	12.79	12.31	11.90	11.39					

* Weighted average computed by authors with following weights—Jan., 8; Feb., 7; Mar., 9; Apr., 7; May, 9; June, 10; July, 8; Aug., 7; Sept., 7; Oct., 7; Nov., 10; Dec., 11.

Source of data: U. S. Dept. Agr. Monthly farm prices of lambs, 1910-1928. Crops and Markets 5 (2): 41. 1928. Current data in monthly issues of Crops and Markets.

TABLE 29
MONTHLY FARM PRICES OF SHEEP, CALIFORNIA, 1910-1929
(Dollars per 100 pounds)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted* average
1910	4.80	4.60	6.40	4.80	5.00	5.60	5.50	5.30	5.70	5.60	4.60	4.70	5.23
1911	5.20	5.20	5.20	5.00	5.50	4.80	4.40	4.10	5.20	4.10	3.70	4.30	4.65
1912	3.80	4.20	4.50	4.60	4.70	4.50	4.20	4.60	4.60	4.20	4.60	4.80	4.43
1913	4.40	4.90	5.10	5.30	4.80	4.80	4.40	4.00	4.30	4.50	4.40	4.70	4.55
1914	4.70	4.90	4.90	5.00	4.90	4.80	4.90	5.10	5.00	5.10	5.20	5.60	5.02
1915	5.50	5.70	5.90	6.00	5.70	5.90	6.00	5.70	5.60	5.60	5.50	5.70	5.71
1916	5.80	6.10	6.10	6.60	6.40	6.60	6.50	6.30	6.30	6.50	6.60	6.70	6.39
1917	7.20	8.10	8.70	10.00	9.70	9.50	10.10	9.70	10.10	10.40	10.70	10.30	9.66
1918	10.90	10.80	11.90	12.00	12.30	11.80	10.90	11.00	11.20	11.00	11.50	11.00	11.29
1919	10.90	10.20	10.80	11.00	10.80	10.00	9.40	9.40	9.50	9.00	9.30	8.90	9.79
1920	10.30	10.80	10.40	10.80	9.80	8.80	8.00	7.70	7.50	7.20	7.00	7.00	8.45
1921	7.00	7.00	6.70	6.50	5.20	5.00	4.80	4.50	4.50	4.50	4.20	4.20	5.13
1922	4.50	5.50	7.20	7.60	6.90	6.30	6.40	7.00	7.00	7.00	7.10	7.20	6.64
1923	7.80	8.40	9.00	8.00	7.70	7.00	7.20	7.70	7.50	6.90	6.80	7.30	7.49
1924	7.90	8.00	8.60	8.00	7.50	7.00	6.50	6.60	6.90	6.80	7.20	6.90	7.18
1925	7.80	8.60	10.20	7.60	7.20	7.90	7.70	7.40	7.70	8.10	9.00	9.10	8.13
1926	9.40	9.10	8.90	8.10	8.70	8.00	7.50	7.40	7.50	7.50	7.20	7.30	7.93
1927	7.60	7.50	7.80	8.60	8.60	7.50	7.20	7.40	8.10	8.00	8.40	8.20	7.89
1928	8.60	8.00	9.00	9.00	8.40	8.00	8.10	7.80	8.00	8.60	8.30	7.80	8.25
1929	8.10	8.70	9.70	9.60	8.30	7.60	7.40	8.00					

* Weighted average computed by authors with the following weights—Jan., 9; Feb., 5; Mar., 5; Apr., 5; May, 8; June, 7; July, 11; Aug., 10; Sept., 11; Oct., 11; Nov., 9; Dec., 9.

Sources of data: 1910-1925, U. S. Dept. Agr., Bur. Agr. Econ. Monthly farm price of sheep in California. Statis. Bul. 17. 146. 1927. 1926-1929, data obtained monthly from U. S. Dept. Agr., Bur. Agr. Econ. Crops and Markets.

TABLE 30
MONTHLY FARM PRICES OF LAMBS, CALIFORNIA, 1910-1929
(Dollars per 100 pounds)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted* average
1910	6.10	5.50	6.50	6.00	5.70	6.80	6.80	6.10	6.50	6.70	5.50	5.50	6.06
1911	6.00	6.00	6.10	6.50	7.00	6.10	5.30	5.10	5.50	4.80	4.60	4.90	6.07
1912	4.60	5.20	5.20	5.70	5.50	5.00	5.20	5.90	5.60	4.90	5.10	5.60	5.37
1913	5.40	5.90	6.50	6.00	5.90	5.50	5.50	4.90	5.10	5.00	5.50	5.50	5.69
1914	5.90	6.10	6.30	6.40	6.00	5.50	6.20	5.90	6.00	6.00	6.10	6.50	6.03
1915	6.70	6.50	7.00	7.00	7.00	6.90	7.00	6.80	6.90	6.40	6.60	6.80	6.83
1916	6.80	6.90	7.20	8.10	7.70	7.60	7.90	7.60	7.60	7.50	7.60	7.60	7.62
1917	8.60	9.10	11.00	11.90	11.20	11.10	11.70	11.50	11.50	11.90	13.20	12.40	11.34
1918	12.70	12.80	14.10	14.30	14.50	14.50	12.90	13.20	13.60	13.00	13.00	12.30	13.81
1919	12.50	12.40	13.00	12.95	12.80	12.10	11.60	12.00	11.40	11.30	10.80	11.30	12.34
1920	12.10	13.00	12.75	14.00	12.60	10.70	10.30	9.80	9.00	9.00	9.00	9.00	11.71
1921	10.00	10.00	9.00	8.50	7.00	7.00	6.90	6.90	6.60	6.70	6.70	6.70	7.62
1922	7.00	8.50	10.30	11.50	11.00	9.30	9.40	10.00	10.00	10.50	11.00	11.50	10.38
1923	11.80	12.60	12.70	11.50	11.00	11.10	10.80	10.80	11.00	10.80	10.80	11.10	11.31
1924	11.00	11.90	12.20	11.60	11.00	10.50	10.00	9.30	9.50	10.00	10.80	11.40	10.95
1925	12.50	13.50	14.10	13.00	11.90	11.60	11.30	11.70	11.80	12.40	12.70	12.90	12.41
1926	13.60	12.80	12.40	12.00	11.60	11.50	12.00	11.80	11.50	11.80	11.40	11.50	11.90
1927	10.90	11.10	11.70	12.50	12.00	11.80	11.60	11.30	11.40	11.60	11.40	11.90	11.80
1928	12.20	12.30	13.00	13.60	13.10	12.50	12.30	11.70	11.90	11.70	11.90	11.50	12.66
1929	11.90	12.50	13.50	14.00	12.70	12.00	11.50	10.30					

* Weighted average computed by authors with the following weights—Jan., 5; Feb., 4; Mar., 9; Apr., 16; May, 27; June, 9; July, 6; Aug., 7; Sept., 2; Oct., 4; Nov., 6; Dec., 5.

Sources of data: 1910-1925, U. S. Dept. Agr., Bur. Agr. Econ. Prices of farm products received by producers; 4, Mountain and Pacific States, U. S. Dept. Agr. Statis. Bul. 17: 146. 1927. 1926-1928, monthly issues of U. S. Dept. Agr. Crops and Markets.

PRICES OF SHEEP AND LAMBS IN CALIFORNIA, 1910-1929

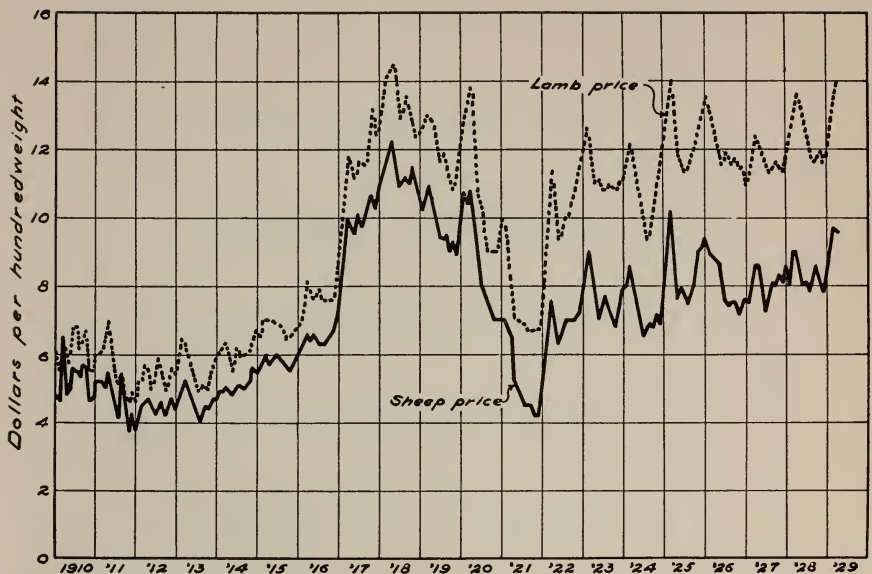


Fig. 17.—Prior to the War, sheep and lamb prices seldom differed by more than one dollar per hundredweight. Since 1922, not only the actual but the relative difference in the prices has widened. At times the actual difference has been as high as \$4.50. Conditions have been similar in most sections of the United States, and as a result most sheepmen are now on a ewe and lamb basis for their operations. (Data from tables 29 and 30.)

Based on the average of prices during the period 1910-1914, lamb prices for both the United States and California have remained at relatively high levels since 1910. While prices declined abruptly in 1920 there was a rapid recovery in 1922. During the past seven years the purchasing power of lambs in both the state and nation has been above 100 per cent. Provided the sheep population is not expanded too rapidly there does not appear to be any reason why the purchasing power of lambs and sheep should go much lower in the immediate future. Price predictions on lambs are very difficult to make on account of the highly perishable nature of the commodity. Milk-lambs might well be compared to head lettuce. A period of less than a week of poor feed conditions or drought will have a radical effect on the quality of the lamb crop, as will delays in transit.⁴⁷

⁴⁷ During the 1929 season the lamb market was affected by many unusual conditions. Considering the increased numbers of ewes bred during the fall of 1928, throughout the western country, indications pointed toward an immense lamb crop. Unsatisfactory weather conditions in other states reduced the numbers of lambs saved. Although 1929 out-of-state shipments broke all previous records, a larger than average percentage of thin lambs were marketed on account of adverse feed conditions.

LAMB-SHEEP PRICE RATIO, CALIFORNIA, 1910-1929

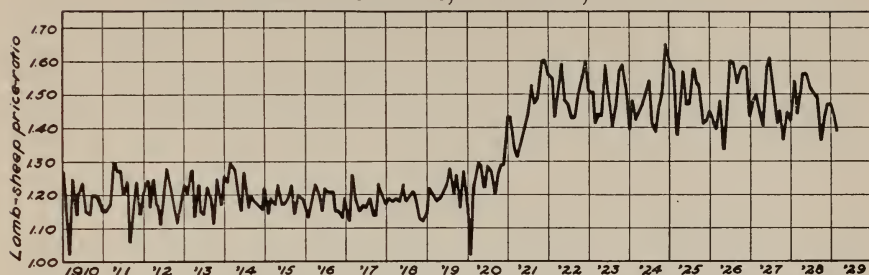


Fig. 18.—From 1910 through 1919, the price which the producer received for 100 pounds (live weight) of lamb was approximately 20 per cent more than that received for 100 pounds (live weight) of sheep. During 1920 and 1921, there was a radical change in this relationship. From 1922 through 1928, the producer has received approximately 50 per cent more for 100 pounds of lamb than for a similar weight of sheep. The economic reason for the change to the ewe and lamb basis can be seen from this figure. (Data computed by authors from tables 29 and 30.)

Thus, compared with beef cattle, predictions as to the price of lambs are much less apt to be correct.

Except for minor fluctuations, there was but little change in the relationship between lamb and sheep prices from 1910 to 1920, although there was a widening in the range between the actual prices received. A distinct and rather abrupt divergence between the price relationships of sheep and of lambs occurred in 1921, sheep prices declining to a relatively greater extent than those for lamb; since the latter date there has been but little change in the relationship (fig. 18).

Although the general price level for lambs (table 31) and wool (table 74) has been favorable during the past few years, a factor which is sometimes overlooked in analyzing the present condition of the industry is the cumulative effect of the transition which has occurred in land tenure in the sheep industry. As homesteading has gradually absorbed the more desirable portions of the public domain, over which sheep had previously grazed, sheepmen have been compelled to buy their range lands. The additional demand for capital which this would normally have entailed was many times increased by the speculation and inflation in land values which occurred throughout the whole country before and after the Armistice.⁴⁸

3. *Quotations on Live Lambs at San Francisco, Los Angeles, and Omaha.*—The Bureau of Agricultural Economics of the United States Department of Agriculture publishes daily quotations on the various weights of livestock and upon the grades within these weights. A

⁴⁸ Perrin, John. Sheep raising in the Twelfth Federal Reserve District. Fed. Reserve Bank of San Francisco Spec. Report 3:1-15. 1921.

range of price is quoted, and in calculations in this bulletin the arithmetic mean of the high and low quotations of the range is used. This type of computation is open to the criticism that a daily sale of each specific grade is not made in a number of markets and that variance in quality from day to day, month to month, and from season to

TABLE 31

RELATIVE FARM PRICES AND RELATIVE PURCHASING POWER OF SHEEP AND LAMBS,
1910-1928

Year	Sheep				Lambs				All Commodity wholesale price index 1910-1914 = 100
	California		United States		California		United States		
	Price per cwt. per cent of 1910-1914 average	Relative purchasing power 1910-1914 = 100	Price per cwt. per cent of 1910-1914 average	Relative purchasing power 1910-1914 = 100	Price per cwt. per cent of 1910-1914 average	Relative purchasing power 1910-1914 = 100	Price per cwt. per cent of 1910-1914 average	Relative purchasing power 1910-1914 = 100	
	1	2	3	4	5	6	7	8	9
1910	109	107	114	111	104	101	108	105	103
1911	97	103	90	96	104	110	89	94	95
1912	93	92	92	91	92	91	94	94	101
1913	95	94	99	97	97	96	102	100	102
1914	105	105	104	104	104	104	106	107	100
1915	120	117	115	112	118	115	116	113	103
1916	134	104	137	106	130	101	138	107	129
1917	202	112	205	114	194	108	207	115	180
1918	236	120	238	120	236	119	235	119	198
1919	205	98	209	100	211	100	218	104	210
1920	177	77	185	80	200	87	200	87	230
1921	107	72	101	68	130	87	121	81	150
1922	139	92	130	86	177	117	164	108	152
1923	157	100	145	92	193	124	177	113	157
1924	150	99	148	97	187	123	181	119	152
1925	170	105	167	103	212	131	207	128	162
1926	166	108	162	105	203	132	195	126	154
1927	165	111	158	106	202	135	192	129	149
1928	173	113	167	109	216	141	204	133	153

Sources of data: Col. 1—Relatives of average prices in table 29. 1910-1914=4.78=100. Cols. 2, 4, 6, 8—Items in cols. 1, 3, 5, 7, divided by wholesale price index in col. 9. 1910-1914=100. Col. 3—Relatives of average prices in table 27. 1910-1914=4.60=100. Col. 5—Relatives of average prices in table 30. 1910-1914=5.85=100. Col. 7—Relatives of average prices in table 28. 1910-1914=5.94=100. Col. 9—U. S. Bur. Labor Statistics all-commodity wholesale price index for the United States. 1910-1914=100.

season, changes actual worth. During the late winter months heavy lambs predominate and light lambs bring a premium, but in the range marketing season choice 75-80-pound lambs often sell in the same price range with 70-75-pound lambs. Since the latter part of 1922 the quotation on light and handyweight slaughter lambs, 84 pounds down, medium, good, and choice grades has been most consistently published. The data in tables 32 to 34 are based on stockyard quota-

tions excepting in the case of San Francisco during the period October, 1922 to March 2, 1927, prior to the opening of the South San Francisco Union Stockyards on the latter date, they were on an 'off car' basis. Since March 2, 1927, quotations have been on the fill and water basis for South San Francisco.

TABLE 32

MONTHLY AVERAGE PRICES FOR SLAUGHTER LAMBS (84 POUNDS DOWN, GOOD AND CHOICE GRADES), SAN FRANCISCO AND OMAHA, 1922-1929
(Dollars per 100 pounds)

SAN FRANCISCO												
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922									11.85	12.41	13.49	13.80
1923	14.35	13.38	12.82			12.01	12.46	11.97	11.25	11.69	12.47	12.66
1924	12.84	13.01	13.69	13.75	10.94*	10.81	10.34	10.36	11.19	12.04	12.81	13.60
1925	15.50	16.22	15.62	14.32*	12.36*	12.08	12.43	12.39	13.44	14.04	14.12	14.23
1926	14.12	13.41	12.60	12.50*	12.25*	12.56	13.26	13.12	13.00	12.75	12.42	11.74
1927	11.25	11.44	12.65	13.11*	12.22*	12.62	12.62	12.01	12.56	12.53	12.55	12.99
1928	12.95	13.86	14.75	15.30*	14.06*	14.01	13.14	12.33	13.44	12.88	12.66	12.98
1929	15.01	16.40	17.02†	14.93*	12.43*	12.53	12.46	12.12	12.11			

* Spring lamb quotation.

† Based on average of three weeks' quotation.

NOTE: Beginning May 1 of each year new crop lambs are considered as lambs 84 pounds down. A similar change is made June 1 at mid-western markets (see Omaha quotations below).

OMAHA												
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1923	13.74	13.79	13.69	13.55	13.29	13.86	13.01	11.96	12.25	12.14	11.72	11.68
1924	12.25	13.54	14.82	15.15	14.08	12.91	12.63	12.58	12.47	12.80	13.16	15.00
1925	16.68	16.14	15.48	14.20	12.37	14.59	14.09	14.08	14.22	14.32	14.42	15.31
1926	14.06	12.69	12.60	13.70	14.26	14.95	13.22	13.14	12.81	12.86	12.40	11.72
1927	11.52	12.37	14.15	15.02	14.01	15.36	13.66	13.07	12.94	13.09	13.27	12.81
1928	12.85	15.80	16.20	18.19	17.84	15.88	14.67	13.94	12.73	12.83	12.67	13.46
1929	15.70	16.01	16.26	16.39	13.17	14.80	13.98	12.77	12.68			

NOTE: Beginning June 1 of each year new crop lambs or spring lambs considered as lambs, 84 pounds down. Spring lamb quotations change from old crop to new crop basis.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Daily Livestock Reports issued by the San Francisco office. Prices represent arithmetic averages computed by the authors for each month.

Quotations have not fluctuated greatly either at San Francisco or Los Angeles, nor has there been any pronounced upward or downward trend during this limited time. These quotations represent the gross price per 100 pounds received after a period on feed and water, and from which, freight, yardage, selling commission and insurance fees are deducted before net returns are remitted to the original shipper.

On account of changes in classification and the lack of a sufficiently long series of data, it is impossible to make accurate computations on the seasonal variation in lamb and sheep quotations for California. Since 1922, quotations on lambs have kept at fairly uniform high levels.

Since lambs constitute an age selection rather than a class, difficulties are encountered in attempting to compile data with reference to quotations throughout the year (tables 32 and 33). In market practice a lamb is a young animal which has not yet acquired its first pair of permanent teeth. When the animal approaches the yearling stage, it is sometimes necessary to inspect the mouth to determine whether it is still a lamb. If it has not yet acquired its first permanent teeth it is considered a lamb. In immature animals sex condition has not had time to exert an important influence on conformation, finish, and quality; hence ewe and wether lambs are considered in a single group.

Lambs are divided into three subclasses—slaughter, feeder and shearer—upon reaching the terminal markets. Slaughter and feeder subclasses are most generally known by producers and others engaged in the industry. Shearer lambs comprise a group of animals similar to feeder lambs. As a rule they are somewhat deficient in finish, but average higher in this respect than feeder lambs. In fact, slaughterers and shearer-lamb buyers frequently compete for the same lambs. The chief object in buying them is to return them to the country, shear them, and later bring them back to market. Hence shearer lambs usually carry a fairly heavy fleece. Occasionally the lamb is fed long enough to raise it one or more steps in the grade schedule before it is returned for slaughter. During the late winter or early spring at the larger public markets some lambs are always purchased as shearer lambs; but the practice is most prevalent when wool is relatively high and the trend of fat-lamb prices upward. It is based partly on the theory that the wool will bring a higher price if removed from the lamb than if it is sold to the slaughterer on the lamb's back, and partly on the expectation of a quick gain in the lamb and a higher market when it is returned for slaughter.

Slaughter lambs are divided into two age selections—'spring lambs' and 'lambs.' The term 'spring lamb' is not easily defined. Theoretically any lamb dropped in the late winter or early spring is a 'spring lamb' and might be so considered until the close of the grass season the following fall. In market practice, however, the term is based on the time of birth combined with the time of marketing.

Hence the term 'spring lamb' is limited to lambs which are born during the winter or very early spring and which come to market between the middle of March and the first of June. The first of them usually come to market shortly before Easter and are in the nature of a delicacy. As a rule these lambs are dropped sometime between January 1 and April 1 in the nation as a whole. However, the interior valleys of California and parts of Arizona are exceptions to this rule. They are marketed when 3 to 5 months old and usually weigh between 55 and 70 pounds.

The new crop or so-called 'spring lambs' are classified and quoted upon as such by the United States Bureau of Agricultural Economics from the time they make their first appearance in appreciable quantities in load lots until the time most of the old-crop lambs (fed lambs) are showing yearling teeth and must, therefore, be classified as 'yearlings' rather than as 'lambs.'

The chief reason for giving spring lambs a special designation is to distinguish them from the more mature lambs, which were born approximately a year earlier and which, as a rule, have been carried through the winter in feed lots. By June most of the latter have attained the age and maturity which make them yearlings. Thereafter they are known as yearling sheep, and the 'spring lamb,' in the meantime, has taken on additional weight and maturity, and in market parlance has acquired a new label, 'lamb.'

On the first Monday in June old-crop lambs are classified in both livestock and meat-market reports as yearlings, and lambs of the current-year's crop as lambs rather than spring lambs, this switch being applicable to markets such as Kansas City, Omaha, St. Joseph, Denver, and Chicago. Because of earlier production and marketing in the west coast and southwestern areas, the markets of Los Angeles, South San Francisco, North Portland, and Fort Worth, find it advisable to make this change in classification at an earlier date, usually on the first Monday in May. This is purely an arbitrary date selection and is not maintained rigidly from year to year by the market news service. It is unfortunate that it is impossible to select a uniform date on which to make this switch in classification for all markets of the country. This cannot be done because in climates such as those of the large lamb-producing sections of the California valley areas, ewes are bred to lamb earlier than they are in most other important lamb-producing sections. In this state lambs become yearlings at an earlier date than those produced in most other sections.

At San Francisco and Los Angeles 'spring lambs' arrive as early as March 15 in sufficient volume so that a regular quotation on 'spring lambs' is published. At many other markets the few which arrive are quoted upon in reporters' comments. Load lot detailed quotations seldom appear until May 1. This inclusion of dates is somewhat arbitrary and leads to confusion among laymen. Lambs born in December or even November at Willows, California, may be marketed at Omaha in May and be correctly called 'spring lambs' whereas if these lambs were shipped to Pacific Coast markets in May they would be called 'lambs 84 pounds down.' Similarly Idaho lambs born in March and sold in Omaha in July, although strictly speaking 'spring lambs' would be quoted on as 'lambs 84 pounds down.'

With the coming of spring there is a decided change in character of receipts of sheep and lambs on the markets of the country. Sheepmen begin shearing. Market supplies are made up of woolled and shorn stock. At the major markets from about May 1 to June 1, or later, 'spring lambs' and 'old-crop lambs'; the former in fleece and the latter largely shorn, are marketed simultaneously in sufficient volume to quote upon. During this time only, it is customary to quote the old-crop lambs on a shorn basis. At other times during the year all sheep and lambs are quoted on a woolled basis. Such loads of fresh-shorn or clipped stock as are sold are covered in comments as clipped lambs, yearlings, or ewes. The 'spring lambs' appearing on the market during the same period as the old-crop lambs are quoted on a woolled basis. 'Spring lambs' are never quoted on a shorn basis in detail.

If sales are made on a shorn basis they are spoken of as 'freshly shorn spring lambs to killers or feeders' and if such sales are considered pertinent market information they are commented upon. It will be noted that all detailed class and grade quotations are on a woolled basis except during a comparatively short period of the year.⁴⁹

Prices on 'spring lambs' are of especial interest to many producers, and on account of the acceleration in the growth of the sheep population of the state during the past seven years and the resulting surplus lambs in the spring of the year, these prices have become of increasing importance. Approximately one-half of the California lamb crop is marketed during March, April, May, and a portion of June. Weekly quotations are listed in table 34. As a general rule, the earlier offerings command higher prices, although it should be noted that early

⁴⁹ The authors are indebted to C. V. Whalin, in charge Livestock, Meats, and Wool Division, U. S. Dept. Agr., Washington, D.C., for explanation of differences in quotations.

COMPARATIVE MARKET QUOTATIONS OF LAMBS, SAN FRANCISCO AND OMAHA, 1925-1929

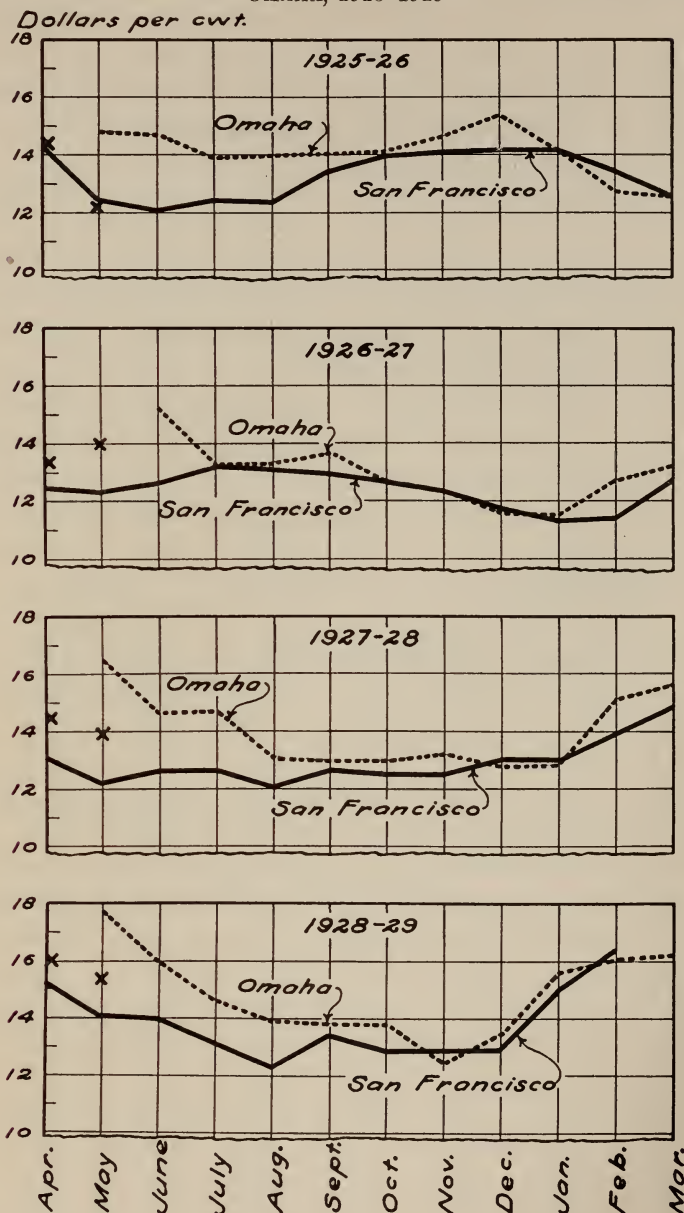


Fig. 19.—The graphs plainly indicate that the greatest differences between San Francisco and Omaha quotations occur during the spring of the year. In the fall California is dependent on supplies of fed lambs both from within and without the state. The state being on an import basis, quotations are closer to those of the middle west during the fall and winter months. The crosses indicate the quotations on old-crop lambs at Omaha during April and May. (Data from table 32.)

shipments are comparatively light in weight and volume. During the season of eight to twelve weeks there is a gradual lowering of prices.

A comparison between prices at San Francisco and Omaha has been made by the authors (fig. 19). Since new-crop lambs appear on the Omaha market at a later date than they do at San Francisco, it is not possible to use comparable data for April, and at times new-crop animals are not quoted at Omaha for the entire month of May. The graphs (fig. 19) show clearly that the greatest differential between quotations at Omaha and San Francisco is in the spring. During the summer months a differential (smaller than during the spring months) exists, while during the past few years quotations for the fall and winter months have differed but slightly.

There is a two-fold danger in attempting to market lambs too early. First, there may be a scarcity of green feed at lambing time. Second, there is danger of encountering a heavy supply of fed lambs on the market, resulting in a lower price. The April and May markets are perhaps safer because by that time most of the fed lambs will have been shipped.

The value of new-crop lambs at mid-western markets each year depends upon supply, demand, and difference in pelt credits between full-wool fed lambs, which are on the market at that time, and recently shorn animals, or those carrying exceedingly light fleeces or short growth of wool. For example, a relatively high wool market enables the packer to receive relatively high value for the pelts taken from full-wool lambs, and vice versa. The price difference may be only \$0.50-\$0.75 per 100 pounds in the case of wooled and recently shorn lambs, although it has been known to amount to \$2.00-\$2.25 per 100 pounds. In some years new-crop lambs on the mid-western markets bring higher prices than old-crop animals due to the preference for lightweight carcasses, and in other years they sell lower than choice lightweight wooled stock. The narrowing and widening of pelt credits is an important factor. At San Francisco, for instance, during August, 1929, freshly shorn lamb pelts brought \$0.90 and full wool pelts, \$1.10, making a difference of only \$0.20. This, on a per hundred-weight basis, is small. Lambs of equal fleshing on the hoof would sell within \$0.15 to \$0.25 of each other per hundredweight whether shorn or wooled, dressing percentages being the same. During September, 1929, shorn pelts remained steady and wooled pelts advanced to \$1.25 each which served to widen the spread again. Wool is the third factor which influences sheep and lamb prices.

Studies of weekly average prices of lambs at Chicago for two 5-year periods (1911-1915 and 1916-1920) show that, as a rule, prices are lowest between June 15 and 30, and highest about the middle of May. It seems probable, however, that this close proximity of the highest and lowest prices is more apparent than real. By the middle of June, most of the lambs coming to market are shorn, whereas a month earlier the bulk of lambs carry a full fleece. The importance of this feature becomes apparent when shorn lambs first reach the market.⁵⁰

It is true that a few carloads of new or spring lambs command a premium above regular good-grade lambs but when one considers the proportion of each kind on the market at Easter time, it is readily seen that spring lambs are in the nature of a luxury rather than a dependable market supply.

Top prices for California lambs at Chicago since 1920 have been as follows:

Date	Price per 100 pounds live weight	Date	Price per 100 pounds live weight
1920: May 11.....	\$20.75	1925: May 5.....	\$17.00
1921: May 17.....	14.10	1926: May 24.....	17.25
1922: May 13.....	17.35	1927: Apr. 25.....	18.00
1923: May 21.....	17.65	1928: Apr. 30.....	19.50
1924 quarantine		1929: May 23.....	17.75

TABLE 33

MONTHLY AVERAGE PRICE FOR SLAUGHTER LAMBS (84 POUNDS DOWN, GOOD AND CHOICE GRADES), LOS ANGELES, 1922-1929
(Dollars per 100 pounds)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1922										13.10	13.48	13.65
1923	14.34	13.70	13.50	11.88	11.47	12.50	12.94	11.57	11.50	12.06	12.25	11.94
1924	12.00	13.40	14.37		11.15	10.39	10.34	10.84	10.74	11.71	11.93	13.52
1925	15.24	15.68	14.81	12.34	10.58	12.67	12.98	13.00	13.42	14.00	14.25	14.25
1926	14.12	13.34	12.12	12.09	12.62	13.59	13.42	13.25	13.17	12.32	12.58	11.57
1927	11.32	11.33	12.47	12.62	12.96*	13.12	13.20	12.30	12.82	13.00	13.00	13.00
1928	13.00	13.55	14.25	13.12	14.93*	14.75	13.34	12.62	13.32	12.67	12.83	12.68
1929	13.73	15.38	15.50	13.66	13.84*	13.70	13.67	13.15	12.07			

NOTE: Beginning May 1 of each year new-crop lambs or spring lambs are considered as lambs, 84 pounds down. A similar change is usually made June 1 at mid-western markets.

* Spring-lamb quotation.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Daily Livestock Reports issued by the Los Angeles office. Prices represent simple averages computed by the authors for each month.

⁵⁰ Spencer, D. A., and M. C. Hall. The sheep industry. U. S. Dept. Agr. Yearbook 1923:287. 1924.

Seasonal Variation in Sheep and Lamb Prices, United States and California.—The lack of a comparable series of prices over a sufficiently long period of time make it difficult to analyze the seasonal variations in the market quotations of sheep and lambs. Calculations based upon farm prices, tables 27 to 30, have been used in computing

TABLE 34

WEEKLY AVERAGE PRICE OF SPRING LAMBS, SAN FRANCISCO, 1923-1929*

(Dollars per 100 pounds)

1923		1924		1925		1926		1927		1928		1929	
Week ending	Price	Week ending	Price	Week ending	Price	Week ending	Price	Week ending	Price	Week ending	Price	Week ending	Price
Mar. 3	13.75			Mar.		Mar.		Mar.		Mar.		Mar.	
10												15	17.10
17	12.75											22	17.15
24	12.54							18	14.13	23	15.63	29	16.55
31	11.85			28	15.25	27	13.25	25	14.25	30	15.50		
Apr. 7	11.50	Apr. 5	12.75	Apr. 4	15.20	Apr. 3	12.65	Apr. 1	14.45	Apr. 6	15.50	Apr. 5	15.50
14	11.67	12	12.35	11	14.80	10	12.50	8	14.40	13	15.45	12	15.10
21	12.08	19	12.00	18	14.30	17	12.50	15	14.15	20	15.35	19	14.75
28	12.25	26	11.20	25	13.75	24	12.50	22	13.73	27	14.90	26	14.66
								29	13.32				
May 5	12.21	May 3	11.05	May 2	13.55	May 1	12.50	May 6	12.90	May 4	14.65	May 3	13.67
12	12.12	10	10.80	9	13.15	8	12.50	13	12.55	11	14.25	10	12.69
19	11.82	17	11.00	16	12.30	15	12.50	20	12.50	18	14.00	17	12.17
26	11.75	24	11.00	23	12.00	22	12.00	27	12.58	25	14.00	24	12.12
		31	10.94	30	12.00	29	12.00					31	12.12
June 2	11.75	June 7	10.35	June 6	12.00	June 5	12.00	June 3	12.62	June 4	14.00	June 7	12.08
9	11.75	14	10.25	13	12.00	12	12.30	10	12.62	11	14.00	14	12.47
16	11.88							17	12.62	18	14.08		

* Quotations: 1923, spring lambs; 1924, spring lambs—good and choice; 1925, spring lambs—medium to choice; 1926, spring lambs—medium to choice; 1927, spring lambs—good to choice; 1928, 1929, spring lambs—good to choice.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Daily Livestock Market Reports issued by San Francisco office.

the seasonal variation in table 35. Lamb prices in California appear to be above normal from December to May and below normal during the remainder of the year. May is apparently an average month and is usually that of the largest sales from farms. From March to August or September there is a gradual decline, while from September to March a gradual improvement in prices occurs. Lamb prices in the United States follow the same general seasonal variation except that there is apparently but little difference between the four months,

March, April, May, and June, all of which are months of relatively high prices. August and September have low indices and from the latter month to March there is a gradual rise in price. This trend prevails in California. Marketings of lambs are greater in the United States during the months August to November than during other months (fig. 21).

Prices for mature sheep in California follow the same seasonal tendencies as do lambs except that the variation is more pronounced in the former case. For the United States, March, April, and May are

TABLE 35

INDICES OF SEASONAL VARIATION IN THE FARM PRICES OF SHEEP AND LAMBS,
UNITED STATES AND CALIFORNIA

(Average month = 100)

Month	Lambs		Sheep	
	United States	California	United States	California
January.....	99.3	102.6	100.9	106.6
February.....	101.5	106.5	102.8	106.8
March.....	104.3	109.8	105.7	114.2
April.....	103.2	104.9	107.8	106.0
May.....	104.9	100.2	106.2	100.9
June.....	103.7	97.6	101.2	93.7
July.....	98.8	95.2	98.2	90.8
August.....	95.5	94.0	95.5	93.0
September.....	96.1	94.9	94.6	95.6
October.....	96.5	96.6	94.3	95.2
November.....	97.7	97.3	95.0	98.5
December.....	98.7	100.4	97.8	98.2

Source of data: Computations by author based upon tables 27, 28, 29, and 30. Link relative method used.

the outstanding months of high sheep prices. The decline from the high point in April to the low point in October is more regular than is the case with lambs. With the present variation in prices the California producer has an advantage in that the larger part of the lamb crop comes to market during the spring of the year (fig. 23).

Stockyard Prices at Chicago.—On account of the availability of long series of data on wholesale prices of livestock at Chicago (table 36), it has been possible to make general comparisons between grades of sheep appearing on that market. These prices do not represent prices paid to producers, and it is highly probable that the latter would not be so favorable. The New York State College of Agriculture⁵¹ has pointed out that the spread between the retail price and

⁵¹ Warren, G. F., and F. A. Pearson. Cost of distributing food. New York State Col. Agr. Farm Economics 2(50):830-836. 1928.

TABLE 36
RELATIVE PRICES AND PURCHASING POWER OF SHEEP AT CHICAGO, 1910-1928

Year	Native sheep		Western sheep		Yearling sheep		Native lambs		Western lambs	
	Relative price	Relative purchasing power	Relative price	Relative purchasing power	Relative price	Relative purchasing power	Relative price	Relative purchasing power	Relative price	Relative purchasing power
1		3	4	5	6	7	8	9	10	11
1910	109	106	106	104	107	105	105	102	103	101
1911	78	82	81	85	77	81	81	85	82	86
1912	94	93	94	94	96	95	98	97	99	98
1913	106	105	105	104	108	106	106	105	106	104
1914	114	114	113	113	112	112	110	110	110	110
1915	130	127	128	125	127	124	126	122	123	120
1916	164	127	158	123	158	122	147	114	147	114
1917	232	129	222	123	222	123	218	121	213	118
1918	250	127	246	124	234	119	230	117	227	115
1919	211	100	209	99	220	105	223	106	219	104
1920	189	82	189	82	206	90	202	88	199	87
1921	96	64	107	72	128	85	130	87	134	90
1922	139	92	149	98	190	125	188	124	184	122
1923	135	86	147	94	183	124	183	120	184	117
1924	147	96	150	99	196	129	199	131	195	128
1925	157	97	159	98	208	128	216	134	211	130
1926	144	93	142	92	187	122	195	127	190	123
1927	139	94	138	93	193	130	196	131	192	129
1928	146	95	141	92	207	135	205	134	199	130

Sources of data: Actual prices upon which relatives in cols. 2, 4, 6, 8, and 10, are calculated are from Chicago Daily Drovers Journal. Sheep and lamb averages. Drovers Journal Yearbook of Figures 1928: 67, 1929. The yearly prices are simple averages. Base 1910-1914=100. Cols. 3, 5, 7, 9, 11—Relatives of items in cols. 2, 4, 6, 8, and 10 divided by all-commodity wholesale-price index. Base 1910-1914=100.

the farm price has increased greatly since the pre-war period, 1910-1914, which would indicate a somewhat higher relative wholesale price when compared with the relative farm price.

Table 36 shows distinctly that there has been an increasing spread between the wholesale prices of lambs and those of sheep at Chicago. While the purchasing power of both lambs and yearlings has been high, that of sheep has been low. The average sheep grower has a variety of products which contribute to the annual income. Enthusi-

TABLE 37

COMPARATIVE PERCENTAGES OF SALES OF THE COMBINED PURE-BRED SHEEP BREEDS, 1924-1928, BY PRICE RANGES

Year	Number sold	Below \$15, per cent	\$15, but under \$100, per cent	\$100 and above, per cent
1924	18,027	24.7	74.6	0.7
1925	27,430	27.0	71.9	1.1
1926	14,376	11.4	86.7	1.9
1927	16,557*	4.6	92.6	2.8
1928	10,597	1.4	94.5	4.1

* The composition by breed of the number sold in 1927 was Cheviot 126, Cotswold 248, Dorset 133, Hampshire 4,353, Lincoln 134, Oxford 486, Rambouillet 9,519, Romney-Marsh 146, Shropshire 1,208, Southdown 204.

Sources of data: 1924-1926, U. S. Dept. Agr. Prices of pure-bred cattle, hogs and sheep. U. S. Dept. Agr. Crops and Markets 4: 140-141. 1927, 1927, U. S. Dept. Agr. Prices of pure-bred sheep, U. S. Dept. Agr. Crops and Markets 5: 132. 1928, 1928, U. S. Dept. Agr. Prices of pure-bred sheep. Bur. Agr. Econ. mimeographed report Apr. 15, 1929.

asm is apt to be too prevalent in connection with returns when the main product of that industry is high in price. Aged sheep contribute to the income of the grower, but the returns from this product have not increased so rapidly as those from lambs, yearlings, or wool.

Prices of Purebreds.—The United States Department of Agriculture has endeavored to obtain sale prices (both at auction and private treaty) of pure-bred sheep in the United States from a large and representative number of breeders. Prices were materially higher in 1928 than in the four preceding years. From the limited data on hand it would appear that purebred prices reach proportionately higher levels than those for ordinary sheep (table 37). When the latter are rising stockmen are encouraged to improve their flocks. Conversely the drop in prices during periods of over-production will be greater because the farmer's demand for purebred stock will then be curtailed. The 1928 report showed that 61 per cent of the purebred sheep sales occurred in the mountain and Pacific states, 28 per cent in the north central, 8 per cent in the southern, and 3 per cent in the north Atlantic states.

TABLE 38

AVERAGE AND RELATIVE WHOLESALE PRICES OF CERTAIN MEATS AT NEW YORK AND CHICAGO, 1910-1929
(Prices are in dollars per pound; relative price 1913 = 100)

Year	Carcass, good native steers, Chicago		Native sides, New York		Hans, smoked, Chicago		Lamb, dressed, Chicago		Mutton, dressed, New York		Pork loins, Chicago		Veal, fresh	
	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Good to prime, New York	Price
1910	0.115	88	0.103	82	0.164	99			0.101	98				
1911	0.112	86	0.098	78	0.140	84			0.075	73				
1912	0.133	102	0.121	97	0.143	86			0.084	82				
1913	0.130	100	0.125	100	0.166	100			0.103	100				
1914	0.136	105	0.135	108	0.167	101			0.101	98			0.181	100
1915	0.129	99	0.126	101	0.153	92			0.107	104			0.185	102
1916	0.138	106	0.134	107	0.185	111			0.125	121			0.182	101
1917	0.167	128	0.164	131	0.252	152			0.166	161			0.190	105
1918	0.221	170	0.209	167	0.318	192			0.198	192			0.226	125
1919	0.233	179	0.215	172	0.343	207			0.167	162			0.274	151
1920	0.230	177	0.206	165	0.334	201			0.198	192			0.302	167
1921	0.163	125	0.148	118	0.268	161			0.162	157			0.316	175
1922	0.150	115	0.138	110	0.264	159			0.104	101			0.301	166
1923	0.158	122	0.145	116	0.212	128			0.120	117			0.300	166
1924	0.171	132	0.151	121	0.202	122			0.119	116				178
1925	0.180	138	0.159	127	0.271	163			0.145	141				167
1926	0.164	126	0.151	121	0.308	186			0.144	140			0.164	177
1927	0.186	143	0.201*	142	0.246	148			0.144	140			0.187	201
1928	0.228	175	0.245	173	0.228	137			0.141	137			0.197	213
1929									0.142	138			0.220	238
Jan.....	0.240	185	0.245	173	0.232	140			0.146	142				
Feb.....	0.209	161	0.215	152	0.231	139			0.148	144			0.240	259
Mar.....	0.211	162	0.217	153	0.217	143			0.181	176			0.231	249
Apr.....	0.224	172	0.225	159	0.248	149			0.190	184			0.235	253
May.....	0.230	177	0.231	163	0.249	150			0.199	168			0.205	221
June.....	0.234	180	0.238	168	0.254	153			0.152	148			0.226	244
									0.131	127			0.238	257

* Classifications changed (1) "native sides" to "good beef," (2) "pork loins" to "fresh pork."

Sources of data: U. S. Dept. Labor. Wholesale prices, 1890-1926. Bur. Labor Statis. Bul. 440: 1-256. 1927. 1927-1929, Bur. Labor Statis. Wholesale prices of commodities. Monthly publications.

MEAT PRICES

Since 1910, lamb prices and to a lesser extent sheep prices have risen more rapidly than the prices of all commodities. It will be of interest to analyze wholesale and retail meat prices in order to ascertain whether the relatively high prices for live animals have been reflected in high wholesale and retail meat prices. Since data are available for other classes of meat than mutton and lamb, comparisons may shed some light on the demand for the various meats.

Wholesale Prices at Chicago and New York.—Data on wholesale prices of meat are unfortunately available only for a limited number of localities. It will be seen from figures published by the Bureau of Labor Statistics that when a comparison is made with the pre-war period, prices of dressed lamb at Chicago, with the exception of 1921, have been consistently higher than those of other meats (table 38). These prices have risen more rapidly than those of other commodities. Dressed-mutton wholesale prices have not risen relatively so high as lamb-carcaass prices, and in many cases they have failed to keep pace with other meats. The consumption of lamb and mutton since the War has been less than during the pre-war period. The lessened supplies and increased demand together with a number of other economic causes, have undoubtedly been important factors in the steady and consistently high lamb-carcaass prices. Calculations made by Wentworth and Clemen⁵² on the wholesale prices of various meats at Chicago have shown that the price of lamb has been steadier than that of other meats. Attention is called to the fact that the base date used in table 38 is 1913. There is no particular reason for selecting this year except that it was the year before the outbreak of the Great War. Prices for lambs were fairly steady, however, for several years prior to 1913.

Quotations on western dressed meats at both Chicago and New York are given in considerable detail by the United States Bureau of Agricultural Economics. In figure 20 quotations for medium beef, good lamb, and good mutton are graphed. Mutton has failed to show the same tendency to rise as lamb. Since 1921 the spread between good mutton and good lamb prices has been greater than previously.

⁵² Wentworth, Edward N., and Rudolph A. Clemen. Livestock and meat prices. Armour's Livestock Bureau. Monthly Letter to Animal Husbandmen 8(8):3. 1927. The coefficient of variability in the price of lamb over the period January 1919–October 1927 was 11.0 per cent compared with an average of 16.6 for all meats studied. Coefficients were calculated on a weekly basis.

AVERAGE WHOLESALE PRICES OF MEDIUM STEER BEEF, GOOD LAMB, AND GOOD MUTTON AT NEW YORK, 1917-1928

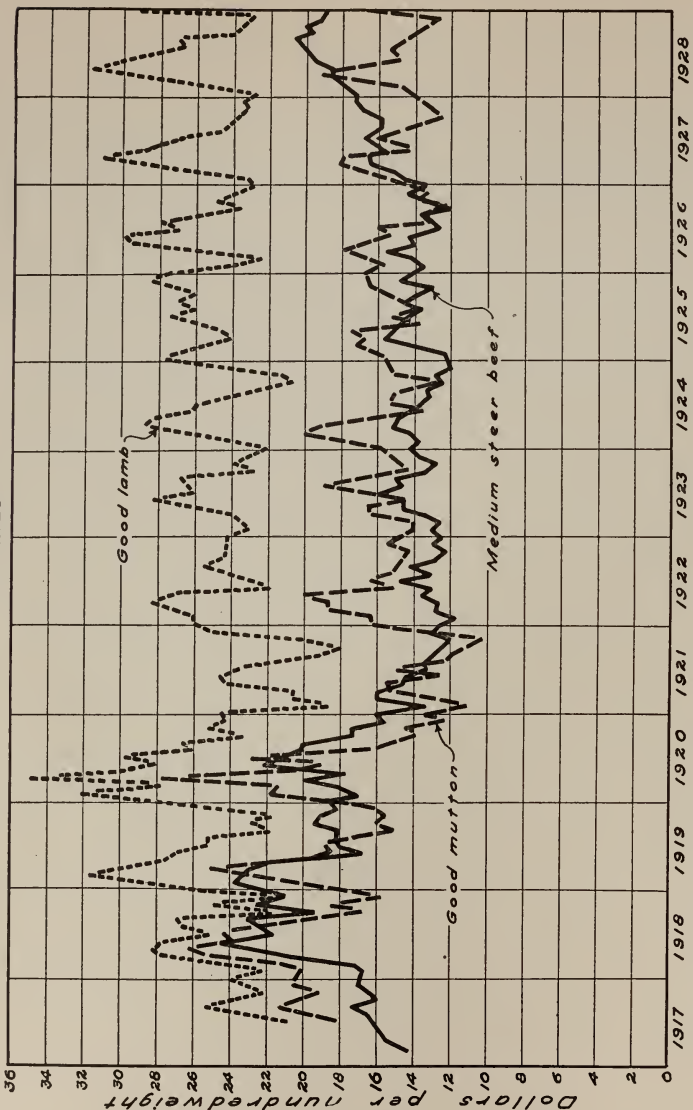


Fig. 20.—Prices of good lamb carcasses at New York experienced a precipitous drop during the latter part of 1920 and the early part of 1921. Recovery was rapid during the latter part of 1921 and since that date prices have held firm. Beef prices, on the other hand, began to decline in 1919 and this downward tendency did not end until the latter part of 1921. Prices strengthened somewhat during the next five years. It was not until 1927 that an upward movement in beef prices started. The gap between lamb and beef-carass prices began to close somewhat during the latter part of 1927. Although mutton is an article of minor importance, it is of interest to note that prices have moved in the same general direction as those of beef until recently. (Data from U. S. Dept. Agr., Bur. Agr. Econ. Current data in U. S. Dept. Agr. Crops and Markets.)

Because of the varying quantities of wool carried by animals at different seasons of the year the seasonal variation of lamb and sheep prices might be misleading (see table 79, p. 247). In order to obviate this difficulty the seasonal variation in the prices of dressed lamb have been computed as follows:

Jan.....	94.8	May.....	111.2	Sept.	97.8
Feb.....	95.0	June	108.4	Oct.	91.0
Mar.	102.3	July.....	101.8	Nov.....	95.1
Apr.....	109.2	Aug.....	97.4	Dec.....	96.0

Average month=100. Computations by authors based upon period Sept., 1917-Aug., 1928.

There is apparently a lag of a month or more in the prices received by producers in the spring and the prices of dressed lamb in New York during the same period. During the remainder of the year—from July until March—this state is a deficiency area rather than a surplus area, and the indices of seasonal variation in producers' prices do not closely follow those for dressed lamb in New York.

Factors Related to Lamb Prices.—In a study by Ezekiel,⁵³ of the Bureau of Agricultural Economics, it has been shown that the most important factors related to the wholesale price of dressed lamb were the general price level and the per-capita production of lamb under inspected slaughter. Next in importance were the prices of steers and veal, although these latter two factors were far less important. Changes in business activity, in hog prices, and the per-capita demand for lamb were of less significance.

Retail Prices, United States and California.—Price data are available over a series of years on only one cut—leg of lamb. Therefore, comparisons with other cuts of meats are not altogether satisfactory. Since 1913, the leg-of-lamb retail price has risen more rapidly and has steadily maintained a higher level than has any other important retail cut of meat (table 39). When compared with the retail cost of food in the United States, the same tendency is noticeable. It is fallacious to reason that this is true for all lamb cuts. Since the wholesale carcass price (table 38) is relatively high in comparison with other meats and commodities, there is reason to believe that the retail price of the lamb carcass has been high. Consumer demand for lamb during the first half of 1929 was considerably stronger than in the same period of 1928, as indicated by higher retail prices and an increase in the movement of lamb into consumptive channels.

Common experience leads one to expect that wholesale and retail prices move in the same direction, with slightly smaller changes in the retail prices than in the wholesale, and with a certain degree of lag in retail price movements as compared to wholesale price movements. In calculations on the retail prices of lamb and other meats at Chicago, Wentworth and Clemen⁵⁴ found that the variation in

⁵³ Ezekiel, Mordecai. Factors related to lamb prices. The Jour. of Pol. Econ. 35:233-260. 1927.

⁵⁴ Wentworth, Edward N., and Rudolf A. Clemen. Livestock and meat prices. Armour's Livestock Bureau. Monthly Letter to Animal Husbandmen 8(8):3. 1927. The coefficient of variability in the weekly prices of leg of lamb over the period January, 1919-October, 1927, was found to be 4.89 per cent compared with an average of 8.69 per cent for all cuts of meat.

TABLE 39

AVERAGE AND RELATIVE RETAIL PRICES OF CERTAIN MEATS IN THE UNITED STATES, 1913-1929
(Prices are in cents per pound; relative price 1913 = 100)

Year	Leg of lamb		Sirloin steak		Round steak		Rib roast		Chuck roast		Plate beef		Pork chops		Bacon, sliced		Ham, sliced		Hens	
	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price
1913	18.9	100	25.4	100	22.3	100	19.8	100	16.0	100	12.1	100	21.0	100	27.0	100	26.9	100	21.3	100
1914	19.5	103	25.9	102	23.6	106	20.4	103	16.7	104	12.6	104	22.0	105	27.5	102	27.3	102	21.8	102
1915	20.4	108	25.7	101	23.0	103	20.1	101	16.1	101	12.1	100	20.3	96	26.9	100	26.1	97	20.8	98
1916	22.6	120	27.3	108	24.5	110	21.2	107	17.1	107	12.8	106	22.7	108	28.7	106	29.4	109	23.6	111
1917	28.9	153	31.5	124	29.0	130	24.9	126	20.9	131	15.7	130	31.9	152	41.0	152	38.2	142	28.6	135
1918	34.9	185	38.9	153	36.9	166	30.7	155	26.6	166	20.6	166	39.0	186	52.9	196	47.9	178	37.7	177
1919	36.5	193	41.7	164	38.9	174	32.5	164	27.0	169	20.2	167	42.3	201	55.4	205	53.4	199	41.1	193
1920	39.3	208	43.7	172	39.5	177	33.2	168	26.2	164	18.3	151	42.3	201	52.3	194	55.5	206	44.7	210
1921	33.7	178	38.8	153	34.4	154	29.1	147	21.2	133	14.3	118	34.9	166	42.7	158	48.8	181	39.7	186
1922	36.6	194	37.4	147	32.3	145	27.6	139	19.7	123	12.8	106	33.0	157	39.8	147	48.8	181	36.0	169
1923	36.7	194	39.1	154	33.5	150	28.4	143	20.2	126	12.9	107	30.4	145	39.1	145	45.5	169	35.0	164
1924	37.1	196	39.6	156	33.8	152	28.8	146	20.8	130	13.2	109	30.8	147	37.7	140	45.3	168	35.3	166
1925	38.6	204	40.6	160	34.7	156	29.6	150	21.6	135	13.8	114	36.6	174	46.7	173	52.6	196	36.6	172
1926	39.0	206	41.3	163	35.6	160	30.3	153	22.5	141	14.6	121	39.5	188	50.3	186	57.4	213	38.8	182
1927	38.9	206	42.6	168	37.1	166	31.3	158	23.7	148	15.4	127	36.8	175	47.2	175	55.0	205	36.9	173
1928	39.4	209	47.8	188	42.0	188	35.0	177	27.9	174	19.0	157	34.8	166	44.0	163	52.9	197	37.4	176
1929:																				
Jan.	39.9	211	48.4	191	42.6	191	35.8	181	29.0	181	20.6	170	32.3	154	43.0	159	53.8	200	39.2	184
Feb.	40.3	213	47.8	188	42.2	189	35.4	179	28.7	179	20.3	168	33.0	157	42.7	158	53.7	200	39.7	186
Mar.	40.9	216	47.9	189	42.2	189	35.5	179	28.8	180	20.3	168	35.2	168	42.9	159	54.3	202	40.5	190
Apr.	41.8	221	49.0	193	43.4	195	36.4	184	29.5	184	20.6	170	37.2	177	43.3	160	54.7	203	41.8	196
May	42.1	223	50.4	198	44.9	201	37.2	188	30.4	190	21.1	174	37.7	180	43.5	161	55.1	205	42.2	198
June	41.2	218	51.2	202	45.8	205	37.6	190	30.7	192	21.3	176	37.7	180	43.8	162	55.3	206	41.4	194

Sources of data: 1913-1922, U. S. Dept. Labor. Retail prices 1890-1925, Bur. Labor Statist. Bul. 416: 38-41. 1926, 1923-1927, U. S. Dept. Labor. Average retail price of principal articles of food Bur. Labor Statist. Mo. Labor Rev. 28 (2): 147-149. 1929, 1928, *ibid.* 28 (2): 147-149. 1929. Current data from Mo. Labor Revs.

TABLE 40
AVERAGE AND RELATIVE PRICES OF CERTAIN MEATS IN SAN FRANCISCO, 1913-1929
(Prices are in cents per pound; relative price 1913 = 100)

Year	Leg of lamb		Sirloin steak		Round steak		Rib roast		Chuck roast		Plate beef		Pork chops		Bacon, sliced		Ham, sliced		Hens	
	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price
1913	16.9	100	20.7	100	19.3	100	21.0	100	14.9	100	13.5	100	23.6	100	33.7	100	31.0	100	24.2	100
1914	18.3	108	20.8	100	19.9	103	21.8	104	15.5	104	14.9	110	24.8	105	34.6	103	32.8	106	24.4	101
1915	18.1	107	20.8	100	19.8	103	21.3	101	14.7	99	13.7	101	23.5	100	33.8	100	34.0	110	24.3	100
1916	19.6	116	20.5	99	19.5	101	20.7	99	14.1	95	13.2	98	23.4	99	34.8	103	34.4	111	26.3	109
1917	25.8	153	23.1	112	22.6	117	22.6	108	16.0	107	15.4	114	31.6	134	44.6	132	43.0	139	23.9	119
1918	32.7	193	30.6	148	30.1	156	28.8	137	22.3	150	20.7	153	40.5	172	57.1	169	52.1	168	42.1	174
1919	33.3	197	31.1	150	30.0	155	29.7	141	22.0	148	19.7	146	45.0	191	61.5	182	58.1	187	48.7	201
1920	35.2	208	32.6	157	30.8	160	31.1	148	21.7	146	18.4	136	45.2	192	62.2	185	59.8	193	50.4	208
1921	31.7	188	30.3	146	28.0	145	28.7	137	18.6	125	15.1	112	40.2	170	56.0	166	54.8	177	46.2	191
1922	34.8	206	30.4	147	27.4	142	28.3	135	18.3	123	14.1	104	38.4	163	53.7	159	55.4	179	46.2	191
1923	34.8	206	29.9	144	27.0	140	28.7	137	17.8	120	13.8	102	35.9	152	50.4	150	52.1	168	40.4	167
1924	35.4	210	31.0	150	28.2	146	29.6	141	18.7	126	14.7	109	36.3	154	49.8	148	52.9	171	41.0	169
1925	38.7	229	31.8	154	28.6	148	30.4	145	19.5	131	15.3	113	42.9	182	58.9	175	61.1	197	42.1	174
1926	37.8	224	32.0	155	29.4	152	29.8	142	19.0	128	15.0	111	45.0	191	63.6	189	66.4	214	44.7	185
1927	38.3	227	35.2	170	30.8	160	30.9	147	20.2	136	15.9	118	42.7	181	58.5	174	64.1	207	43.3	179
1928	39.5	234	38.6	186	36.6	190	34.7	165	24.1	162	19.3	143	40.2	170	55.5	165	61.3	198	43.2	179
1929:																				
Jan.	42.5	251	41.2	199	39.8	206	37.1	177	27.0	181	22.0	163	38.5	163	55.0	163	62.2	201	44.5	184
Feb.	42.8	253	40.9	198	39.3	204	36.2	172	26.5	178	21.0	156	38.9	165	54.8	163	26.0	203	44.8	185
Mar.	43.4	257	41.1	199	39.4	204	36.8	175	26.9	181	21.0	156	40.7	172	56.0	166	62.9	203	44.5	184
Apr.	43.1	255	40.9	198	39.4	204	37.0	176	26.6	179	21.4	159	42.0	178	56.0	166	63.3	204	44.5	184
May	40.7	241	41.0	198	39.2	203	36.6	174	25.8	173	20.5	152	42.1	178	55.3	164	63.3	204	44.8	185
June	38.7	229	40.6	196	38.7	201	35.5	169	25.2	169	20.0	148	42.0	178	55.7	165	63.1	204	45.0	186

Sources of data: 1913-1919. U. S. Dept. Labor. Retail prices in the U. S. Bur. Labor Statist. Bul. 270: 402-405 1921; 1920, *ibid.* Bul. 300: 135, 158, 1922; 1921-1922, *ibid.* Bul. 315: 142, 165. 1923, *ibid.* Bul. 334: 135, 157. 1924, *ibid.* Bul. 396: 160, 207. 1926; 1925-1926, *ibid.* Bul. 445: 148, 149, 195. 1927, 1928, 1929, U. S. Dept. Labor Bur. Labor Statist. Average retail prices of principal articles of food. Monthly issues, Mo. Labor Rev.

TABLE 41

AVERAGE AND RELATIVE RETAIL PRICES OF CERTAIN MEATS IN LOS ANGELES, 1913-1929
(Prices are in cents per pound; relative price 1913=100)

Year	Leg of lamb		Sirloin steak		Round steak		Rib roast		Chuck roast		Plate beef		Pork chops		Bacon, sliced		Ham, sliced		Hens	
	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price	Price	Relative price
1913	18.8	100	23.5	100	20.8	100	18.3	100	15.7	100	12.6	100	25.1	100	33.7	100	35.3	100	26.6	100
1914	19.1	102	23.4	100	21.2	102	19.8	108	16.2	103	13.2	105	26.0	104	34.1	101	35.6	101	27.1	102
1915	18.4	98	22.6	96	20.1	97	19.0	104	15.3	97	12.3	98	24.1	96	33.5	99	34.1	97	25.6	96
1916	20.8	111	23.5	100	21.0	101	20.0	109	16.0	102	12.6	100	25.1	100	34.6	103	36.0	102	26.7	100
1917	26.7	142	26.8	114	23.1	111	22.1	121	18.3	117	15.0	119	23.9	131	46.1	137	46.3	131	29.1	109
1918	32.5	173	31.8	135	29.7	143	27.7	151	23.0	147	19.0	151	42.0	167	59.9	178	56.9	161	39.2	147
1919	32.4	172	33.5	143	30.5	147	28.7	157	22.5	143	18.3	145	46.2	184	63.8	189	62.0	176	46.3	174
1920	35.5	189	36.9	157	32.4	156	30.8	168	22.4	143	17.9	142	48.9	195	62.8	186	65.8	186	49.0	184
1921	31.4	167	34.9	149	29.9	144	29.3	160	19.2	122	14.8	117	41.3	165	54.2	161	60.8	172	44.8	168
1922	32.5	173	34.2	146	28.2	136	28.3	155	17.8	113	12.8	102	38.6	154	51.5	153	61.2	173	41.3	155
1923	33.3	177	33.8	144	27.6	133	28.1	154	17.7	113	12.9	102	36.9	147	49.8	148	58.0	164	39.7	149
1924	33.8	180	35.3	150	29.1	140	28.8	157	19.5	124	13.9	110	37.8	151	47.7	142	58.4	165	40.2	151
1925	37.0	197	36.5	155	29.7	143	28.6	156	19.2	122	13.7	109	44.3	176	54.9	163	63.9	181	42.0	158
1926	36.9	196	36.6	156	30.0	144	29.4	161	19.9	127	14.3	114	45.7	182	59.3	176	69.2	196	44.4	167
1927	36.7	195	38.0	162	31.1	150	30.0	164	20.9	133	14.5	115	43.5	173	55.3	164	68.4	194	42.8	161
1928	37.7	201	42.8	182	35.5	171	33.8	185	25.2	161	18.1	144	41.1	164	50.9	151	67.1	190	43.9	165
1929 :																				
Jan.	37.7	201	45.6	194	38.6	186	35.1	192	28.0	178	21.0	167	41.2	164	49.7	147	67.2	190	46.2	174
Feb.	38.9	207	45.0	191	38.3	184	35.4	193	27.8	177	20.7	164	41.0	163	50.2	149	68.2	193	46.2	174
Mar.	40.1	213	45.6	194	38.3	184	35.6	195	27.8	177	20.3	161	44.6	178	50.0	148	67.6	192	46.2	174
Apr.	40.3	214	45.8	195	38.3	184	35.8	196	27.8	177	20.0	159	43.5	173	49.3	146	68.6	194	47.4	178
May	39.5	210	45.6	194	38.6	186	35.5	194	27.2	173	19.2	152	43.4	173	48.9	145	68.2	193	46.2	174
June	39.4	210	45.3	193	38.2	184	35.4	193	26.6	169	18.0	143	44.0	175	48.8	145	67.4	191	47.3	178

Sources of data: 1913-1919. U. S. Dept. Labor. Retail prices in the U. S. Bur. Labor Statist. Bul. 270: 228-231. 1921; 1920, *ibid.* Bul. 300: 111-149. 1922; 1921-1922, *ibid.* Bul. 315: 118-156. 1923; 1923, *ibid.* Bul. 334: 111-149. 1924; 1924, *ibid.* Bul. 336: 112-189. 1926; 1925-1926, *ibid.* Bul. 445: 100, 101, 177. 1927. 1927, 1928, 1929, U. S. Dept. Labor Bur. Labor Statist. Average retail prices of principal articles of food. Monthly issues, Mo. Labor Rev.

price was far less than in the case of wholesale prices. Leg-of-lamb prices held far more stable than the prices of all cuts studied with the exception of that for sirloin steak.

Retail prices of leg-of-lamb at both San Francisco and Los Angeles (tables 40 and 41) confirm the general statements made with reference to the prices for this cut in the United States.

Efforts to demonstrate the value of cuts other than the leg and loin should be encouraged by those interested in the sheep industry. An increased demand for other cuts might lower the retail price of the above-mentioned cuts and at the same time enhance the value of the carcass as a whole.

STORAGE HOLDINGS OF MUTTON AND LAMB

Compared with the total production of mutton and lamb, storage holdings have been small except during the year beginning September, 1921, at which time heavy imports were received from New Zealand. There is a fairly well defined seasonal variation. Stocks begin to accumulate during the fall of the year when larger supplies arrive on the markets. As a rule the peak in holdings is reached during the winter or early spring. From this time withdrawals from the coolers have been somewhat irregular, minimum supplies being reported from April to October during the past five years. Cold-storage holdings on the Pacific Coast have been almost negligible during the past few years.

Frozen mutton in California is almost wholly used by such large buyers as the United States Navy and various steamer and freighter services. A small percentage is utilized by certain classes of foreigners. The supply of mutton holdings in cold storage on the Pacific Coast approximately meets the needs of the Navy and various shipping companies. A few concerns operating to Australia and New Zealand find it convenient to store supplies at certain seasons in these countries, especially if Pacific Coast prices for carcass mutton are relatively high.

GENERAL MARKET MOVEMENTS OF SHEEP

Market Receipts, United States.—Records of receipts on sixty to seventy markets of the country have been kept over a considerable period of years (table 42). While such data give some indication of total supplies, they should be considered in conjunction with stocker and feeder shipments. Stimulated by high prices received during

the war, receipts reached a peak in 1919. A low point in receipts was reached in 1923; since that time they have been climbing, arrivals during 1928 being larger than in any year since 1919. With the expansion in population, offerings of sheep will move upward. If

TABLE 42

SHEEP RECEIPTS AT ALL PUBLIC STOCKYARDS AND PERCENTAGE MONTHLY RECEIPTS,
UNITED STATES, 1915-1929

Receipts

(Thousands, i.e., 000 omitted)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
1915	1,517	1,257	1,248	1,019	1,050	1,080	1,264	1,725	2,501	2,359	2,042	1,373	18,435
1916	1,450	1,280	1,156	1,144	1,347	1,394	1,451	1,984	2,650	3,231	2,126	1,479	20,692
1917	1,578	1,384	1,257	1,152	1,059	1,240	1,353	1,764	2,554	3,195	2,102	1,583	20,221
1918	1,354	1,096	1,270	1,159	1,214	1,429	1,639	2,270	3,496	3,327	2,605	1,626	22,485
1919	1,594	1,157	1,268	1,438	1,468	1,775	2,287	3,360	3,854	3,754	2,845	2,456	27,256
1920	1,614	1,416	1,315	1,466	1,488	1,640	2,034	2,606	2,895	3,027	2,471	1,566	23,538
1921	1,792	1,516	1,750	1,677	1,916	1,850	1,776	2,500	2,618	3,042	2,068	1,664	24,169
1922	1,835	1,400	1,465	1,227	1,692	1,700	1,677	1,951	2,303	3,311	2,288	1,516	22,365
1923	1,636	1,366	1,430	1,447	1,794	1,426	1,661	1,800	2,659	3,465	1,816	1,526	22,026
1924	1,697	1,412	1,367	1,348	1,344	1,550	1,672	2,005	3,027	3,295	1,879	1,605	22,201
1925	1,467	1,388	1,504	1,541	1,689	1,603	1,699	2,064	2,627	3,198	1,712	1,608	22,100
1926	1,548	1,486	1,694	1,502	1,717	1,913	1,739	2,277	3,279	3,090	1,917	1,706	23,869
1927	1,740	1,501	1,558	1,486	2,013	1,816	1,676	2,209	2,848	3,587	1,896	1,609	23,939
1928	1,705	1,669	1,520	1,591	1,952	1,913	1,898	2,362	3,386	3,938	2,053	1,610	25,597
1929	1,876	1,543	1,526	2,010	2,169	1,749	.....	.....	.....	.....	.....	.....	.....

PERCENTAGE MONTHLY SHIPMENTS

1915	8.23	6.82	6.77	5.53	5.70	5.86	6.86	9.36	13.57	12.80	11.08	7.45	.....
1916	7.01	6.19	5.59	5.53	6.51	6.74	7.01	9.59	12.81	15.61	10.27	7.15	.....
1917	7.80	6.84	6.22	5.70	5.24	6.13	6.69	8.72	12.63	15.80	10.40	7.83	.....
1918	6.02	4.87	5.65	5.15	5.40	6.36	7.29	10.10	15.55	14.80	11.59	7.23	.....
1919	5.85	4.24	4.65	5.28	5.39	6.51	8.39	12.33	14.14	13.77	10.44	9.01	.....
1920	6.86	6.02	5.59	6.23	6.32	6.97	8.64	11.07	12.30	12.86	10.50	6.65	.....
1921	7.41	6.27	7.24	6.94	7.93	7.65	7.35	10.34	10.83	12.59	8.56	6.89	.....
1922	8.21	6.26	6.55	5.49	7.57	7.60	7.50	8.72	10.30	14.81	10.23	6.78	.....
1923	7.43	6.20	6.49	6.57	8.15	6.47	7.54	8.17	12.07	15.73	8.25	6.93	.....
1924	7.64	6.36	6.16	6.07	6.05	6.98	7.53	9.03	13.63	14.84	8.46	7.23	.....
1925	6.64	6.28	6.80	6.97	7.64	7.25	7.69	9.34	11.89	14.47	7.75	7.28	.....
1926	6.49	6.23	7.10	6.29	7.19	8.01	7.29	9.54	13.74	12.95	8.03	7.15	.....
1927	7.27	6.27	6.51	6.21	8.41	7.59	7.00	9.23	11.90	14.99	7.92	6.72	.....
1928	6.66	6.52	5.94	6.22	7.63	7.47	7.41	9.23	13.23	15.38	8.02	6.29	.....

Source of data: Receipts, U. S. Dept. Agr. Receipts and disposition at public stockyards. Crops and Markets. Percentage monthly receipts computed by authors.

values are to be kept at present levels, sheep receipts should not increase too rapidly. Receipts in turn are influenced by inventories, which the sheepmen can regulate.

The monthly record of receipts shows a distinct seasonal movement. During the months of August, September, and October, heaviest supplies are received, range lambs appearing during these months.

A second peak in receipts, not so pronounced as the previous one, is developing during May and June when fat native lambs weaned from their mothers are shipped. It is this recent bulge which should be of interest to the California producer.

ORIGIN OF SHEEP AND LAMB RECEIPTS AT PUBLIC STOCKYARDS, 1927

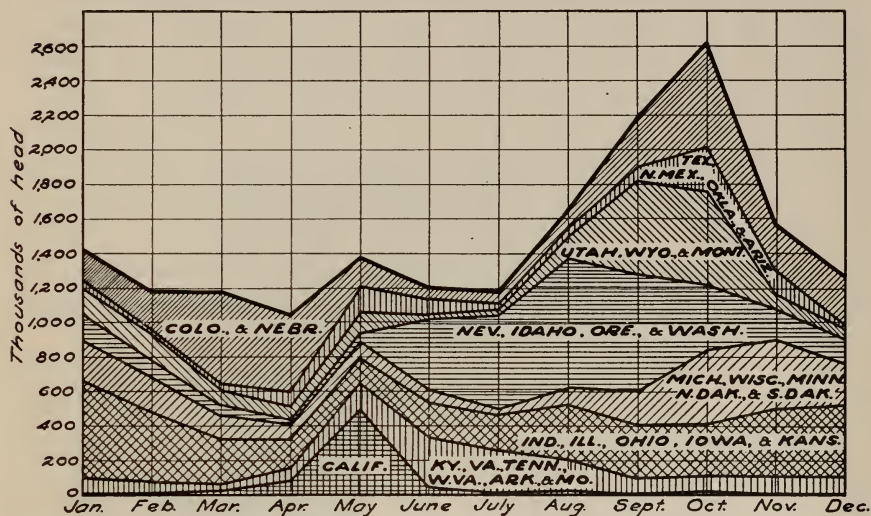


Fig. 21.—Although the above data are not strictly accurate (see text, p. 88) this chart serves to illustrate the competition between different sections of the country in the sheep and lamb trade. Receipts from California are highly seasonal, appearing in quantity only during April, May, and June. (Original data from which chart is drawn was furnished authors by the U. S. Dept. Agr., Bur. Agr. Econ.)

About thirty years ago economic conditions in the western sheep industry caused a change from marketing animals as yearlings or older, to marketing them as lambs. This developed a peak in fall marketing. During the three years 1915–1917, 55 per cent of the sheep came to market during the five months August to December, which condition was not conducive to favorable market prices. Since the war, market runs of milk-fat lambs have appeared in the late spring. During the three years 1926–1928, receipts during the period August to December were reduced to approximately 51.5 per cent of the year's total; this change has undoubtedly had a favorable effect on prices.

Sheep Markets.—On the basis of the 1924–1928 average, the following are the leading sheep markets of the United States: (1) Chicago, (2) Omaha, (3) Denver, (4) Kansas City, (5) St. Joseph, (6) Jersey City, (7) Buffalo, (8) Ogden, (9) Pittsburgh, (10) Pueblo.

Sources of Sheep Receipts.—In figure 21 is shown the total number of sheep from different states received at public stockyards or shipped direct to packing plants, where the latter figures are available. For some states they are almost complete, but for others they show only a part of the total market movement. They also include considerable duplication, since the various markets report livestock passing through them in transit, and not net receipts. For states that ship a large number of feeder lambs direct to feed lots the market receipts do not begin to show total shipments. Estimates of total lamb production by states are shown in figure 22. Neither do the figures show the total movement of lambs to eastern markets, since a record of the state of origin of receipts at some of the important eastern markets is not available. Hence, shipments of early lambs marketed in May, June, and July, from Kentucky, Tennessee, Virginia, West Virginia, Maryland, and Pennsylvania are not complete records of the movements from these states.⁵⁵

With these limitations in mind, figure 21 can be used in showing the origin or market receipts during the year. The first lambs come to market from this state usually between March first and April first. Between the latter date and the middle of June this run is fairly heavy for a period of from four to six weeks. Approximately one-fifth to one-third of the sheep movement of the country during May originated in California in recent years (fig. 21). There is some competition between California spring lamb and the fed lambs of the previous season. The fed-lamb movement generally ends towards the close of March. In some of the states east of Mississippi, lambs dropped in November or December and sheltered during the winter are put on the market at this time ('hot-house lambs').

In late April or early May, lambs from Tennessee appear on the market, followed about two weeks later by those from Kentucky.⁵⁶ During the run of Kentucky lambs come those from Missouri, followed by the first of the milk lambs from Idaho and Washington. The large shipments of milk lambs from Kentucky, Tennessee, and the Rocky Mountain sections do not begin, as a rule, until the end of the California movement. About the first of June, Virginia lambs reach the market, followed in a couple of weeks by those from West Virginia and Ohio. By July the run from the corn belt states is in full swing,

⁵⁵ The authors are indebted for the data from which figure 21 is made to C. L. Harland, Livestock Statistician, Bureau of Agricultural Economics. The comments in this paragraph are the result of correspondence with Mr. Harlan.

⁵⁶ Johnson, E. C. Marketing Kentucky livestock. Kentucky Agr. Exp. Sta. Bull. 278:43-102, figs. 1-12. 1927.

and lambs also arrive from New York, Pennsylvania, Wisconsin, and Michigan. The big range runs usually start in August with Idaho and Oregon lambs at first predominating. Lambs from Oregon, Washington, Nevada, Utah, New Mexico, Colorado, Montana, and Wyoming reach the high points in shipment in September and October. During August and September between 60 and 70 per cent of the receipts at public stockyards originate in the western states.

RELATIVE IMPORTANCE OF MAIN LAMB-PRODUCING STATES, 1926-1928

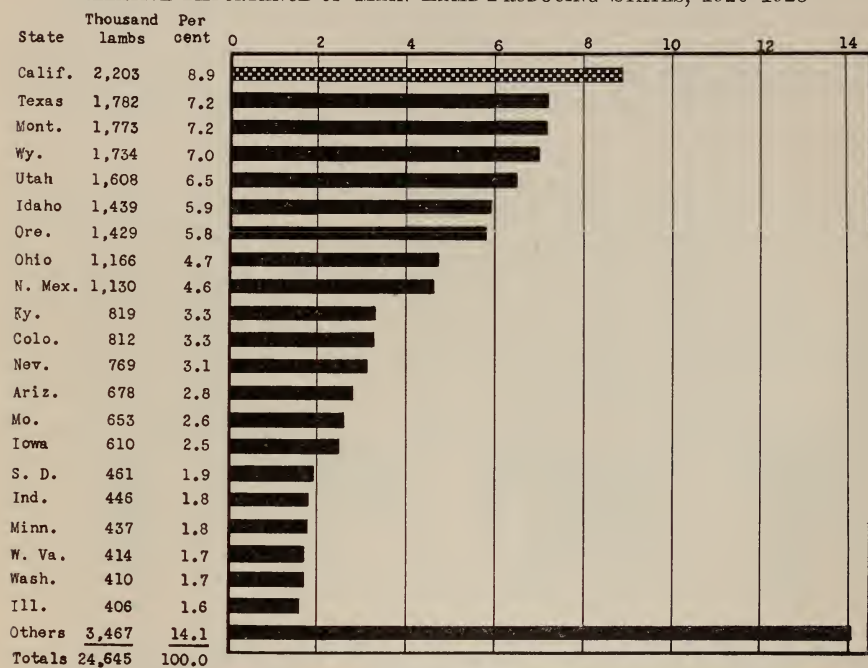


Fig. 22.—California produces more lambs than any other state. The largest producers of lambs are the western states, only four of the twenty-one leading lamb-producing states lying east of the Mississippi River. (Data from Bur. Agr. Econ., Washington, D.C.)

Many of these range lambs are unfit for slaughter and are sold to the feeder. Great numbers of these unfinished lambs are fed in the corn-belt states, and are marketed during January, February, and March.⁵⁷

Lambs are winter-fed in Colorado and Nebraska in large numbers, being fattened largely on alfalfa, beet pulp, and grain. They begin to move in December and furnish the principal source of supply during January, February, and March. The marketing season may continue for a full month after the advent of spring lamb from California.

⁵⁷ Nearly 45 per cent of the feeder shipments occur during September and October.

The progressive sheepman of California should realize that he is experiencing competition from Arizona, Idaho, Kentucky, Tennessee, Virginia, and other states in the spring-lamb trade. In 1928 close to 100,000 ewes were lambled in Arizona for spring lambs.⁵⁸ Receipts of Arizona sheep and lambs at Kansas City, alone during 1929 were 106,396 head, according to M. Y. Griffin, in charge of Livestock Reporting Office, Kansas City, Missouri. Although Texas has a large sheep population, that state will never be a factor in this trade, as

TABLE 43

SHIPMENTS OF STOCKER AND FEEDER SHEEP AND LAMBS FROM PUBLIC STOCKYARDS
AND PERCENTAGE MONTHLY SHIPMENTS, UNITED STATES, 1916-1929

Shipments

(Thousands, i.e., 000 omitted)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1916	73	77	62	57	67	83	100	340	661	1,065	546	145	3,276
1917	126	108	69	102	76	146	195	368	968	1,195	791	306	4,450
1918	128	122	124	221	161	242	212	525	1,105	1,246	763	360	5,209
1919	229	131	136	207	160	223	340	1,039	1,505	1,386	860	740	6,956
1920	311	140	135	269	234	227	324	568	796	1,059	857	259	5,179
1921	88	62	84	107	123	89	139	404	555	731	511	202	3,095
1922	183	169	143	97	145	191	204	350	534	1,138	757	256	4,167
1923	171	169	114	82	216	117	188	341	897	1,489	540	154	4,478
1924	149	106	83	105	118	153	226	444	973	1,438	676	206	4,677
1925	138	119	94	109	178	137	193	421	857	1,392	475	220	4,333
1926	155	107	83	124	130	238	260	567	1,093	1,150	493	223	4,623
1927	207	136	140	118	259	257	216	390	947	1,560	497	174	4,901
1928	116	101	95	133	205	278	234	564	1,080	1,466	544	193	5,009
1929	188	115	122	210	217	226	.....	.....	.....	.....	.....	.....	.....

PERCENTAGE MONTHLY SHIPMENTS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1916	2.23	2.35	1.89	1.74	2.05	2.53	3.05	10.38	20.17	32.50	16.66	4.43	.....
1917	2.83	2.43	1.55	2.29	1.71	3.28	4.38	8.27	21.75	26.85	17.78	6.88	.....
1918	2.46	2.34	2.38	4.24	3.09	4.65	4.07	10.08	21.21	23.92	14.65	6.91	.....
1919	3.29	1.88	1.96	2.98	2.30	3.21	4.89	14.94	21.64	19.93	12.36	10.64	.....
1920	6.01	2.70	2.61	5.19	4.52	4.38	6.26	10.97	15.37	20.45	16.54	5.00	.....
1921	2.84	2.00	2.71	3.46	3.97	2.88	4.49	13.05	17.93	23.62	16.51	6.53	.....
1922	4.39	4.06	3.43	2.33	3.48	4.58	4.90	8.40	12.81	27.31	18.17	6.14	.....
1923	3.82	3.77	2.55	1.83	4.82	2.61	4.20	7.62	20.03	33.25	12.06	3.44	.....
1924	3.19	2.27	1.78	2.25	2.52	3.27	4.83	9.50	20.81	30.75	14.46	4.41	.....
1925	3.18	2.75	2.17	2.52	4.11	3.16	4.46	9.72	19.78	32.13	10.96	5.08	.....
1926	3.35	2.31	1.80	2.68	2.81	5.15	5.62	12.26	23.64	24.88	10.66	4.82	.....
1927	4.22	2.77	2.86	2.41	5.29	5.24	4.41	7.92	19.33	31.84	10.14	3.55	.....
1928	2.32	2.02	1.90	2.65	4.09	5.55	4.67	11.26	21.56	29.27	10.86	3.85	.....

Sources of data: Shipments, U. S. Dept. Agr. Stocker and feeder shipments. Crops and Markets, 69. Percentage monthly shipments computed by authors.

⁵⁸ Letter from Prof. E. B. Stanley, Animal Husbandman, Arizona Agr. Exp. Sta. to authors, Nov. 28, 1928.

conditions are primarily favorable for wool production. Merino sheep predominate and early spring feed is not available to produce fat lambs.⁵⁹

Stocker and Feeder Shipments, United States.—A considerable part of the receipts on the sheep markets of the country consist of the

NET SHIPMENTS AND CONSUMPTION OF SHEEP AND LAMBS, CALIFORNIA, 1926-1928

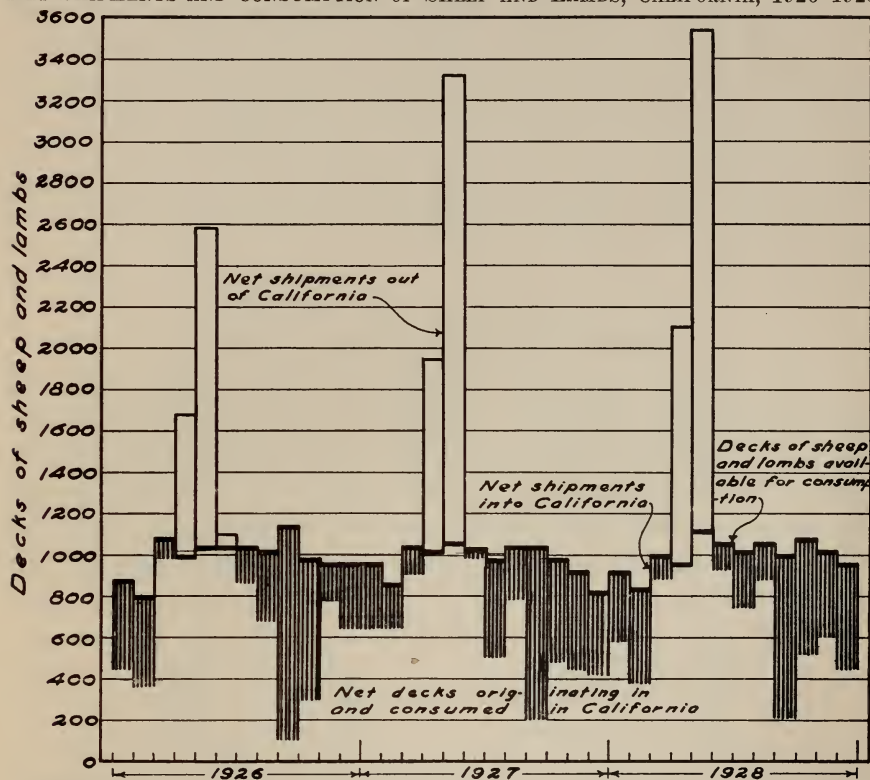


Fig. 23.—The heavy broken black lines represent the number of sheep and lambs available for consumption by months during 1926-1928. The shaded area below the heavy black lines (representing animals available for consumption) for each month represents net shipments of sheep and lambs into California from other states. The unshaded areas below and above the heavy black lines represent sheep and lambs originating in the state. A net out-of-the-state movement occurs only during the spring months, primarily in April and May. (Data computed by authors from tables 21, 47, and 51. 1 deck = 140 sheep or lambs in these computations.)

stocker and feeder type (table 43). During the five years 1923-1927, 20.13 per cent of the total receipts of sheep at public stockyards were reshipped from the market to farms and feed lots. This movement is highly seasonal, the greater volume of feeder shipments occurring during the four months, August to November, when approximately

⁵⁹ Letter from R. F. Miller, Associate Animal Husbandman, California Agr. Exp. Sta. to authors, Oct. 31, 1928.

70 per cent are shipped. The low month is March. These animals, coming largely from the northwestern range states, are too thin for slaughter and are sold to the feed lots of the corn-belt states.

On the basis of the number reshipped, Denver, Omaha, Chicago, Kansas City, and Ogden were the leading feeder-sheep markets of the country. The first four markets handle nearly 62.8 per cent of the feeder sheep and lambs that pass through public stockyards. During the five years mentioned Denver reshipped 52.6 per cent of its receipts as feeders or breeders; Omaha 30.2 per cent; Kansas City 22.3 per cent; and Chicago 16.0 per cent. These four markets combined shipped 27.7 per cent of their receipts back to the country. While the greater number of feeder sheep are sent through the public stockyards, a large number are sent direct from the range to feed lots.

MARKETING CALIFORNIA SHEEP

Spring-Lamb Shipments.—During the spring months of April and May, California produces more lambs than are necessary for consumption in the state (fig. 23). The two principal methods of marketing these lambs are as live lambs (table 44) at mid-western markets and as dressed lambs at Atlantic Coast markets (table 45). The approximate number of both live and dressed lambs shipped out of the state during each season (March 15–June 15) has been:

1922.....	265,000	1926.....	300,000
1923.....	300,000	1927.....	427,000
1924.....	275,000	1928.....	445,000
1925.....	345,000	1929.....	579,000

These figures do not include mountain 'spring lambs' which usually account for from 25,000 to 50,000 additional. These are shipped after the close of the spring-lamb season. On account of inadequate statistical records the early period of this movement cannot be studied, although these annual movements have occurred for at least a quarter of a century. According to a San Francisco slaughterer's record, the first shipment of California 'spring lambs' to markets east of the Rockies was made in 1898 when 54 cars, or approximately 8,000 lambs, left Lassen County. These were shipped in July or August.

California sheepmen should be cognizant of the fact that this product is marketed in eastern centers in approximately three months of the year and that the favorable prices received during the past few years are the result of placing high-quality lambs on the market

TABLE 44
SHIPMENTS OF LIVE LAMBS OUT OF CALIFORNIA, 1922-1929
(March 15-June 15)

1922		1923		1925		1926		1927		1928		1929	
Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head
April	5,200	March 15	5,200	March 21	1,400	March		March 19	600	March 17	2,240	March 16	600
	7,000	23	0	28	1,960			26	609	24	6,160	23	897
	26,600	31	11,080			April				31	2,300	30	2,915
	26,320	April 7	13,440	4	6,720	3	3,360	April 2	3,092	April 7	1,200	6	7,783
		14	8,820	11	1,960	10	3,920	9	1,981	14	2,600	13	18,578
22		21	8,120	18	14,560	17	2,800	16	10,778	21	10,639	20	30,883
29		28	12,600	25	15,960	24	5,320	23	19,580	28	32,191	27	79,096
May		May		May		May		May		May		May	
6	58,100	5	37,800	2	32,250	1	17,980	7	67,730	5	66,602	4	72,619
13	40,320	12	60,200	9	46,760	8	48,020	14	80,801	12	111,680	11	120,406
20	21,280	19	63,840	16	69,440	15	44,100	21	96,531	19	88,611	18	88,516
27	14,700	26	52,000	23	23,660	22	44,800	28	48,068	26	39,385	25	75,801
June		June		June		June		June		June		June	
3	7,000	2	12,600	6	12,320	5	19,460	4	14,712	2	16,879	7	4,331
						12	5,200	11	3,333	9	3,233	14	1,139
						19	1,400			16	540		
	206,500		285,700		254,150		228,560		369,553		384,260		520,274

Sources of data: U. S. Dept. Agr., Bur. Agr. Econ. Mimeographed reports issued by San Francisco and Los Angeles, Calif., offices, July 12, 1928. 1929 data from U. S. Dept. Agr., Bur. Agr. Econ.

at the proper time. The necessity of producing better lambs cannot be overemphasized. The question of the expansion of the industry is naturally raised. With the great increase which has taken place in shipments, future growth should proceed along conservative lines.

During the five years, 1925–1929, shipments of dressed lamb have been comparatively stationary, such increase as has taken place in the total out-going movement being in live-lamb shipments. The bulk of the dressed lamb has been sent from Los Angeles and San Francisco, with occasional offerings from San Diego and Sacramento.

FREIGHT RATES TO SAN FRANCISCO AND LOS ANGELES FOR SHEEP AND LAMBS
FEBRUARY 1, 1929

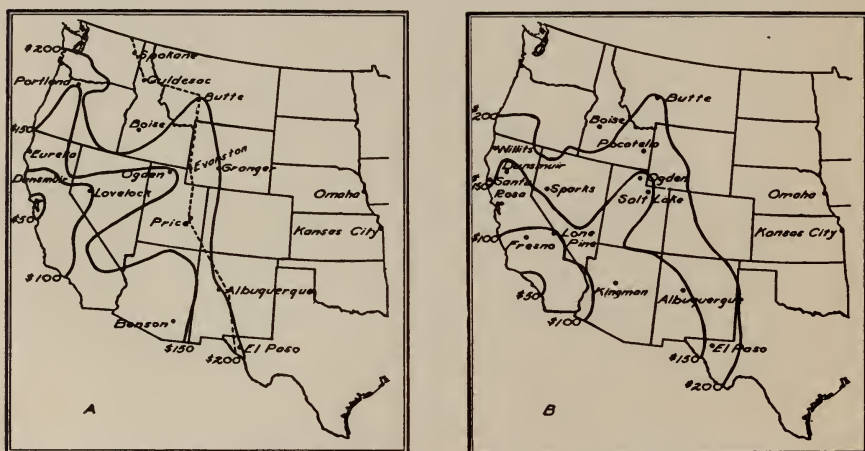


Fig. 24.—The figures indicate the doubledeck carload freight rates on sheep and lambs to (A) San Francisco, California, and (B), Los Angeles, California. The \$200 rate means a transportation cost of about 70 cents a head; the \$150 rate, 54 cents; the \$100 rate, 36 cents; and the \$50 rate, 18 cents. The broken line on A shows the dividing line west of which sheep or lambs may be shipped at a cheaper rate to San Francisco or Los Angeles, than to Kansas City or Omaha. (Data for maps were compiled by California Wool Growers Association, San Francisco, California.)

Since all lambs moving by express refrigerator cars out of California must be slaughtered and handled under the provisions of the United States Meat Inspection Act, there cannot be any rapid expansion in this method of marketing for the physical capacities of the present plants now in operation are limited. At present there are only four major packing plants operating regularly under the Meat Inspection Act that participate in this method of handling lambs, and they have mid-western and eastern branch-house connections closely affiliated with the parent plants in California. A few firms without

eastern branch houses have occasionally slaughtered lambs on order from larger dressed-lamb buyers in Atlantic coast areas. There might be some expansion along this line in the future.

Any progress which has been made in moving dressed lambs has been attributed almost wholly to the willingness of the major express

TABLE 45
EASTERN SHIPMENTS OF DRESSED LAMBS OUT OF CALIFORNIA, 1924-1929

1924*		1925		1926		1927		1928		1929	
Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head	Week ending	Head
Mar.		Mar.		Mar.		Mar.		Feb. 25	597	Mar.	
		14	583	13	1,880	19	1,100	Mar. 10	638	16	737
		21	700	20	3,230	26	2,800	17	3,488	23	7,016
		28	3,387	27	6,200			24	3,606	30	5,027
								31	5,352		
April		April		April		April		April		April	
5	3,000	4	9,169	3	2,523	2	1,090	7	3,958	6	6,203
12	5,400	11	5,209	10	650	9	5,280	14	3,510	13	6,342
19	7,200	18	10,701	17	2,470	16	7,780	21	4,600	20	5,058
26	8,800	25	6,671	24	7,700	23	7,699	28	6,147	27	5,105
						30	9,429				
May		May		May		May		May		May	
3	13,400	2	7,549	1	9,630	7	8,050	5	7,536	4	6,600
10	16,800	9	9,596	8	12,430	14	8,069	12	5,547	11	7,300
17	42,120	16	9,765	15	9,170	21	5,054	19	5,695	18	4,483
24	36,607	23	7,140	22	3,131			26	6,158	25	3,125
31	16,100	30	3,000								
June		June		June		June		June		June	
7	16,400	6	2,419					2	3,955	1	1,300
14	14,700										
21	4,975										
28											
July											
5	4,425										
18	2,100										
26	1,325										
Totals.	195,352		75,889		59,019		57,551†		60,787		58,296

* Foot and mouth quarantine caused most of the lambs to be dressed in California and shipped east. About 80,000 live lambs were shipped from six northeastern counties.

† 1,200 dressed lambs, not in weekly totals are included in grand total.

Sources of data: U. S. Dept. Agr., Bur. Agr. Econ. Mimeographed report issued by the San Francisco and Los Angeles offices, July 12, 1928. 1929 data from U. S. Bur. Agr. Econ.

companies to make reductions in rates during emergency periods, such as during the foot-and-mouth disease epidemic in 1924. Until the outbreak of the foot-and-mouth disease the express rate to the Atlantic coast for several years had been \$5.67 per hundredweight. This was reduced to \$4.28 in 1924. Coupled with this was a reduction in freight rates on live lambs from country points to San Francisco,

TABLE 46

ORIGIN OF SPRING LAMB SHIPMENTS IN CALIFORNIA, 1922-1929*

Season—March 15 to June 15

(Single-deck carloads of lambs)

Section and county	1922	1923	1925	1926	1927	1928	1929
<i>North coast</i>							
Humboldt.....					5	30	
Mendocino.....				16	10		
Sonoma.....	42	60	30	32		8	20
Napa.....	6	8	22	18	40	28	38
Marin.....						4	
Total.....	48	68	52	66	55	70	58
<i>South coast</i>							
San Francisco.....		4					
Alameda.....	29	26		8	34	34	24
San Mateo.....		16				8	
Contra Costa.....	45	31	46	76	88	58	72
Santa Clara.....				3		4	6
San Benito.....					4		6
Monterey.....	8	12			16	24	58
San Luis Obispo.....							8
Total.....	82	89	46	87	142	128	174
<i>Sacramento Valley</i>							
Shasta.....			18		2		
Tehama.....	30	11	94	34	38	24	62
Glenn.....	268	346	460	380	500	515	696
Butte.....	18	153	85	158	160	226	302
Yuba.....				28	33	50	50
Colusa.....	192	272	165	224	350	464	500
Sutter.....		49	78	32	149	186	80
Nevada.....							
Placer.....		38		16	21	14	56
Sacramento.....	11	97	83	54	74	82	175
Yolo.....	65	114	135	90	170	132	302
Solano.....	130	189	250	112	286	344	358
El Dorado.....						8	14
Amador.....		13					4
Total.....	714	1282	1368	1128	1783	2045	2599
<i>San Joaquin Valley</i>							
San Joaquin.....	74	121	111	63	92	158	168
Calaveras.....	18	21	16	71	60	82	76
Stanislaus.....	56	15	6	28	54	60	76
Merced.....	106	18	103	4	42	48	108
Madera.....	12		26	20	20	16	10
Fresno.....	396	132	80	52	238	76	296
Tulare.....		18	20	41	19	8	10
Kings.....		137	84	4	6		
Kern.....	28	55	28	34	54		36
Total.....	690	517	474	317	585	448	780

TABLE 46—(Concluded)

Section and county	1922	1923	1925	1926	1927	1928	1929
<i>Southern California</i>							
Santa Barbara.....					10		
Imperial.....		14	60	26		16	
Total.....		14	60	26	10	16	
<i>Northern and Eastern Mountain Counties</i>							
Lassen.....					4		
Inyo.....					10		
Total.....					14		
Grand total.....	1534	1970	2000	1624	2589	2707	3611

* This movement represents lambs moving to middle-western markets. The compilations are derived from common carrier passings at Needles, Calif., Yuma, Ariz., and Ogden and North Salt Lake City, Utah. During 1924 shipments were curtailed on account of the foot-and-mouth disease.

Sources of data; U. S. Dept. Agr., Bur. Agr. Econ., San Francisco, Calif.; W. W. Wofford, U. S. Dept. Agr., Bur. Agr. Econ., Los Angeles, Calif.

Los Angeles, Sacramento, and San Diego. Present (1929) freight rates are shown in figure 24. The rate of \$4.28 was continued in 1925. During 1926-1927 the rate was again raised to \$5.06. On March 26, 1928, it was reduced to \$4.50.

Since 1922 there has been considerable expansion in the area from which live spring lambs have been shipped (table 46), although the actual increase has been greatest from counties in the Sacramento Valley (fig. 25). Almost the entire crop of spring lambs originate in either the valley or adjoining foothill counties of the Sacramento and San Joaquin. During 1929 Glenn County moved 696 single-deck cars, Colusa 500, Solano 358, Butte 302, and Yolo 302. Fresno followed with 296.

The factor of transportation has played an increasing part in this expansion. During recent years all common carriers in the state have cooperated with the existing local sheep and wool growers organizations in reducing the time in transit, improving corral facilities, selecting suitable hay and pure fresh water in order to expedite the movement of these highly perishable lambs. In time past train movement was slow, corral facilities crude, and employees of the roads at times neglectful. However, complaints have of late been reduced to a minimum by attention of officials, despatchers, trainmen, and others connected with the common carriers.

Climate and resulting feed conditions have a most significant bearing on the origin of spring-lamb shipments. Lambs are forced to

COUNTY ORIGIN OF CALIFORNIA SPRING LAMBS SHIPPED EAST, 1922-1926

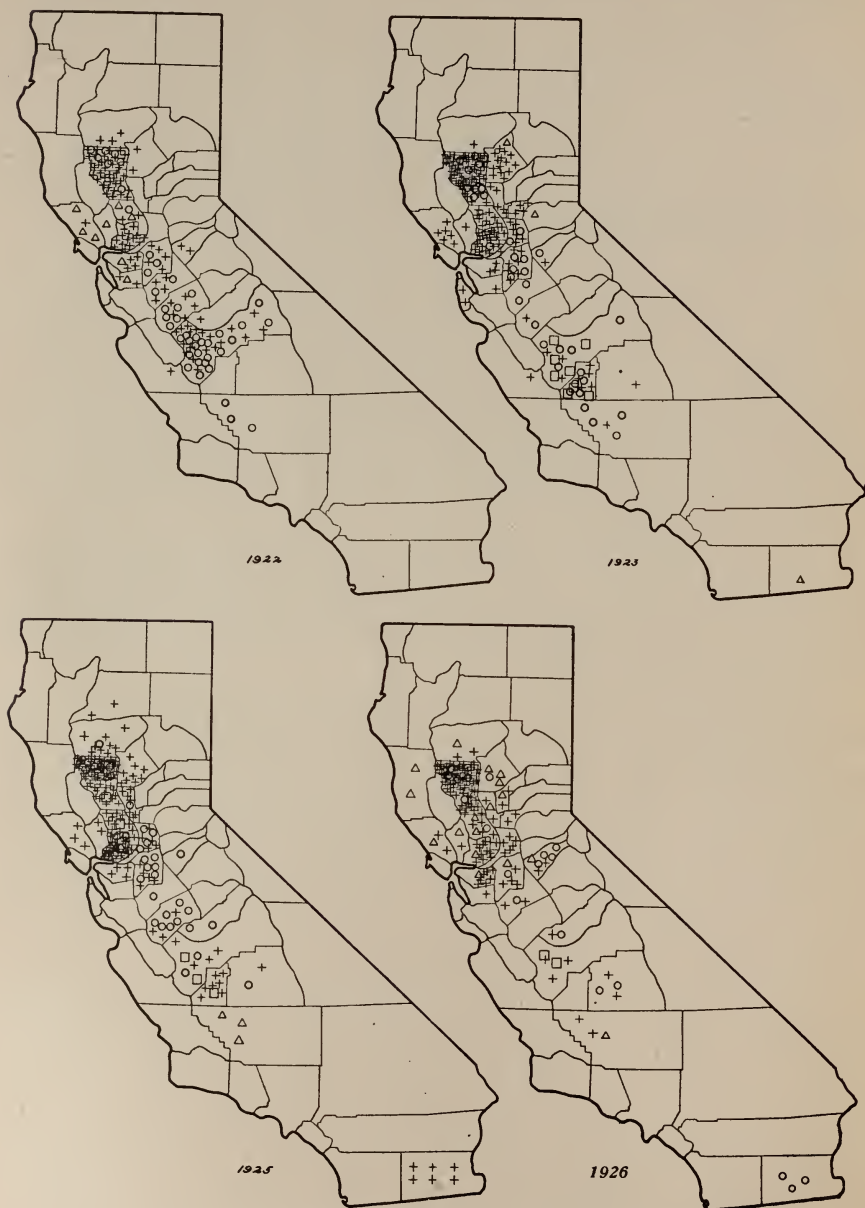


Fig. 254.—Each □ represents 10 single decks shipped during March, a ○ represents 10 decks shipped in April, a +, 10 decks in May, and a Δ, 10 decks in June. During 1928, approximately 76 per cent of the live lambs shipped east had their origin in the Sacramento Valley counties, while around 20 per cent originated in the San Joaquin Valley counties. Generally speaking, a larger percentage of March and April lambs originate in the latter section. (Unpublished data in offices of authors.)

COUNTY ORIGIN OF CALIFORNIA SPRING LAMBS SHIPPED EAST, 1927-1929

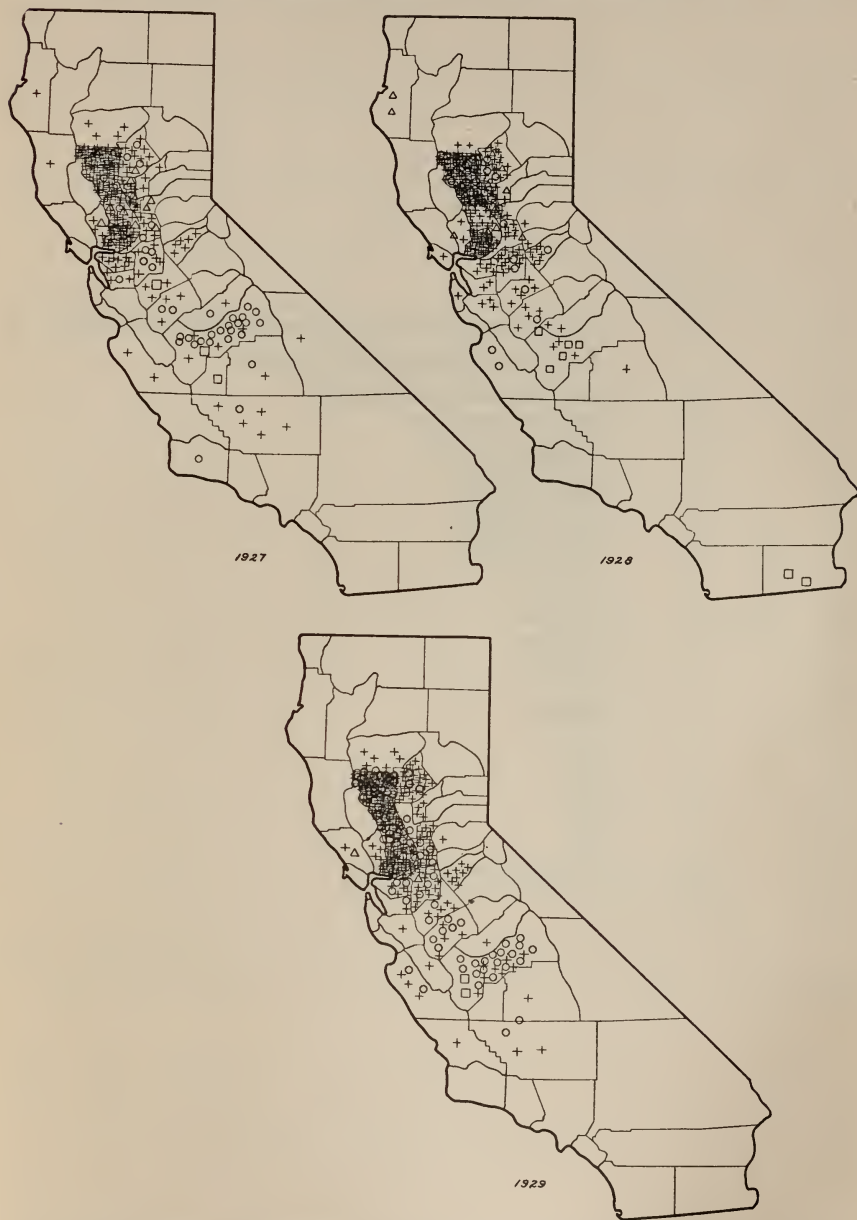


Fig. 25B.—Each □ represents 10 single decks shipped during March, a ○ represents 10 decks shipped in April, a +, 10 decks in May, and a Δ, 10 decks in June. During 1928, approximately 76 per cent of the live lambs shipped east had their origin in the Sacramento Valley counties, while around 20 per cent originated in the San Joaquin Valley counties. Generally speaking, a larger percentage of March and April lambs originate in the latter section. The map for 1928 is perhaps more typical than that for 1927. (Unpublished data in offices of authors.)

rapid maturity on choice green feed and mothers' milk. Mr. George J. Cleary, an experienced lamb shipper states, "The best lambs shipped out of California are from ewes which are fed a grain ration to supplement the grass pasture from lambing to shipping time, and excellent results have been obtained by feeding a small grain ration

PRINCIPAL CALIFORNIA COUNTIES SHIPPING SPRING LAMBS TO MID-WESTERN AND EASTERN POINTS

Season, March 15-June 15; Average 1925-1928

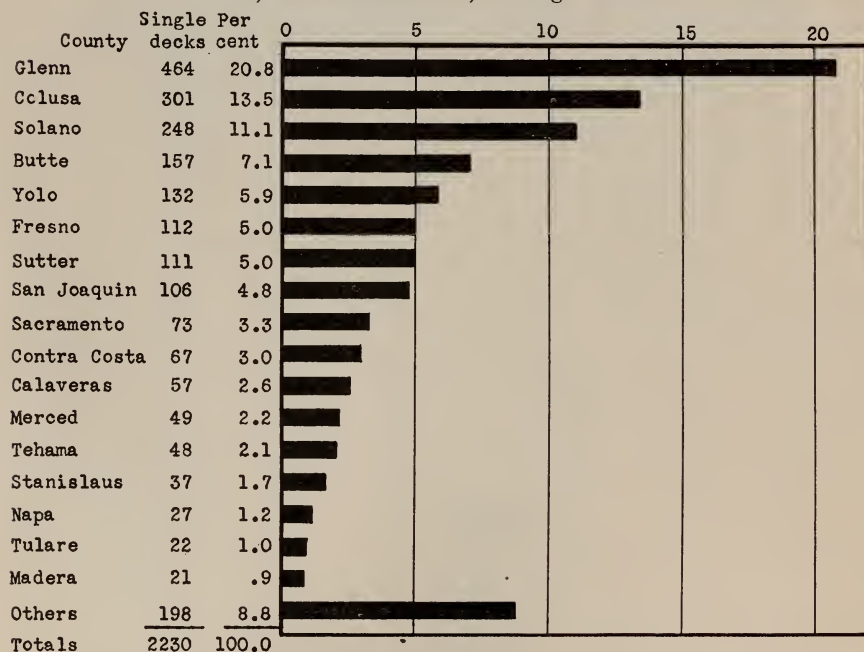


Fig. 26.—The source of the largest shipments of spring lambs is the Sacramento Valley. Counties shipping the largest numbers of spring lambs are not necessarily those with the largest sheep population. Compare with figure 5. (Data from table 46.)

in creeps to the lambs between marking and shipping. One most important consideration in producing quality lambs is to ship them while in 'bloom' and this is accomplished by shipping them before the milk of the ewe is dried up. Care must also be exercised to keep ewes and lambs on green grass continuously between lambing and shipping. A few days' shortage of green feed generally means a set-back for the lambs from which they will not recover in time to enable them to be shipped as prime milk lambs.⁶⁰ It will be noted (table 46) that

⁶⁰ Letter from George J. Cleary, San Francisco, Calif., to Edwin C. Voorhies, Feb. 15, 1929.

shipments from the San Joaquin Valley did not show a tendency to rise until 1929. Several years of relatively low precipitation (1923–1925) made feed conditions unfavorable. An examination of the March shipments illustrates the influence which an early or a late season may have during that month.

A study of table 44 should be of particular interest to California sheepmen. Surplus lambs from the state are usually sent out between March 15 and June 15, which means that the bulk are slaughtered during April, May, and June. These have been and still are months of below-normal slaughter in the United States, although since 1915 there has been a tendency toward more even distribution of slaughter. These months are also below normal in receipts on the central markets. During eight weeks of the heavier California movement, the average weekly shipments do not exceed 60,000 head, whereas during the late-summer peak movement from the Rocky Mountains it is not unusual to have a weekly movement of at least five times this amount. This limited California movement is the chief cause of the high price received for California 'spring lambs.'

It will be noted that especially during the three months of heavy California offerings there has been a pronounced relative increase. Although California is in a favorable position and some increase will undoubtedly be desirable over a period of years, the present rate of increase cannot long continue without adverse results to the shipper.

Recently lambs similar in quality to the California product have been received from the warmer valleys in Arizona during an almost identical season. These found their way to Kansas City. Records for 1926 indicate that Arizona marketed about 100,000 head of sheep and lambs at Kansas City, approximately 58,000 arriving in April, May, and June.

*Methods of Marketing Live Lambs.*⁶¹—In marketing live lambs in California any of the following general methods may be used:

1. At the ranch—

- a. f. o. b. ranch, dollars per 100 pounds.
- b. f. o. b. ranch, dollars per head.

2. Shipment to markets by growers—

- a. Stockyards.
- b. Off the cars.

⁶¹ W. P. Wing, Secretary, Calif. Wool Growers Assoc. assisted materially in writing pages 101 to 115.

TABLE 47
SHEEP AND LAMBS SHIPPED OUT OF CALIFORNIA, 1923-1928
(Single decks)

Destination	1923	1924	1925	1926	1927	1928												
						Total	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Arizona.....	23		247	192	10	266			8	182	58	15		2	6	2		1
Colorado.....	65	23	8	76	52	57				14	29						6	
Hawaii.....					3													
Idaho.....						3						2			1			
Illinois.....	1,429	43	1,685	1,204	2,337	2,534			39	607	1,720	91	40	37				
Indiana.....				83														
Iowa.....		4			2													
Kansas.....		45																
Maryland.....				3									2					
Mexico.....						2												
Montana.....			10		1													
Missouri.....	291	119	302	393	311	298			16	110	159				3		10	
Nebraska.....	330	159	224	180	397	397				57	297	4	2	36	1			
Nevada.....	129	166	183	150	203	127	13			42	23	2		3	27	14	2	1
New Mexico.....	6			5	1	6												6
New York.....					6													
Ohio.....					1													
Oregon.....	33	5	24	7	16	48		4		17	11	11	1			4		
Pennsylvania.....					2													
Texas.....	9		61	11	13	24			1	10	1		6	2		2		
Utah.....	28		13	52	23	12			1	2	2	4		1	2		1	
Washington.....	58		16	124	80	11			2	8								
Wyoming.....					1													
Totals.....	2,401	564*	2,773	2,480	3,459	3,785	13	6	67	1,049	2,300	129	51	81	40	22	19	8

* Foot-and-mouth disease quarantine.

Source of data: Calif. Wool Growers Assoc., San Francisco, Calif.

The common practice in California prior to 1922 was to purchase lambs at country points on the per-head basis, buyers usually being more accurate in estimating the dressing percentages and weights of various lots of lambs than were growers. In this way local buyers could purchase lambs at country points, advantageously sorting the lightest end of bands for shipment to California markets and the stocky, heavier end for mid-western markets. Recently some killers

LIVE SPRING LAMBS SHIPPED EAST FROM CALIFORNIA, 1926-1929

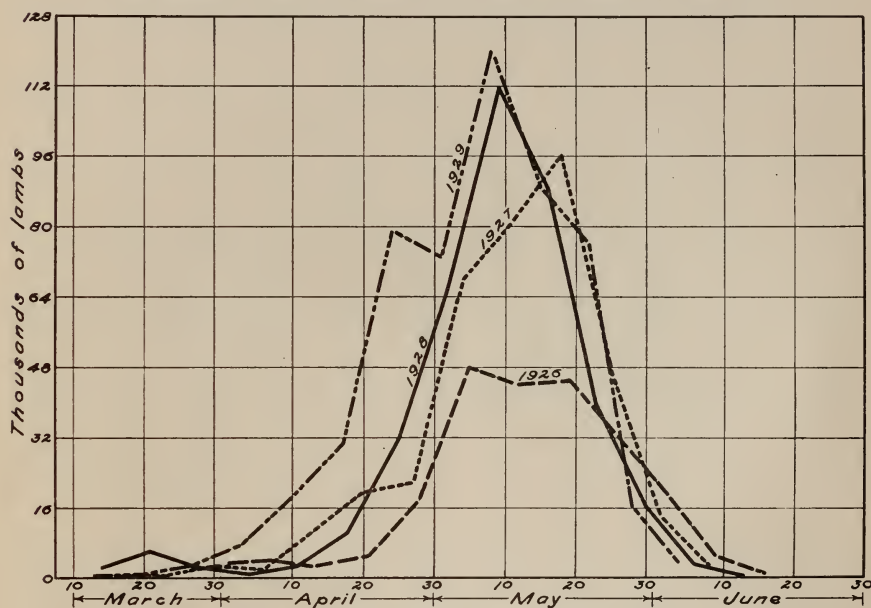


Fig. 27.—The graphs in the above figure represent the weekly movement of live spring lambs to the east. The bulk of the lambs are moved during a four or five weeks' period, the peak of the movement usually occurring during the first three weeks of May. The 1929 season was especially early on account of weather and feed conditions. (Data from table 44.)

and sheepmen's organizations have urged buying lambs on the per-pound basis rather than by the head. Both believe the per-pound basis more satisfactory, as thus the poor market type of lamb is penalized on account of its lack of weight and quality.

On account of the necessity of keeping supplies moving to market in an orderly volume and of lessening the risk of marketing such a highly perishable commodity, and also on account of competition for needed supplies during March, April, May, and June, a considerable part of the early lamb crop is usually contracted several months in advance of delivery. In contracting for the purchasing of fat

lambs, the larger lamb buyers make a common practice of following the crop into the various sections of the state. It is estimated that during the 1925 and 1928 seasons about two-thirds of the early crop was contracted by local slaughterers and large eastern lamb shippers before the first of May.

By far the greater portion of the business of purchasing lambs for mid-western shipment has centered in the San Francisco Bay district, where a number of local killers are situated, as well as several

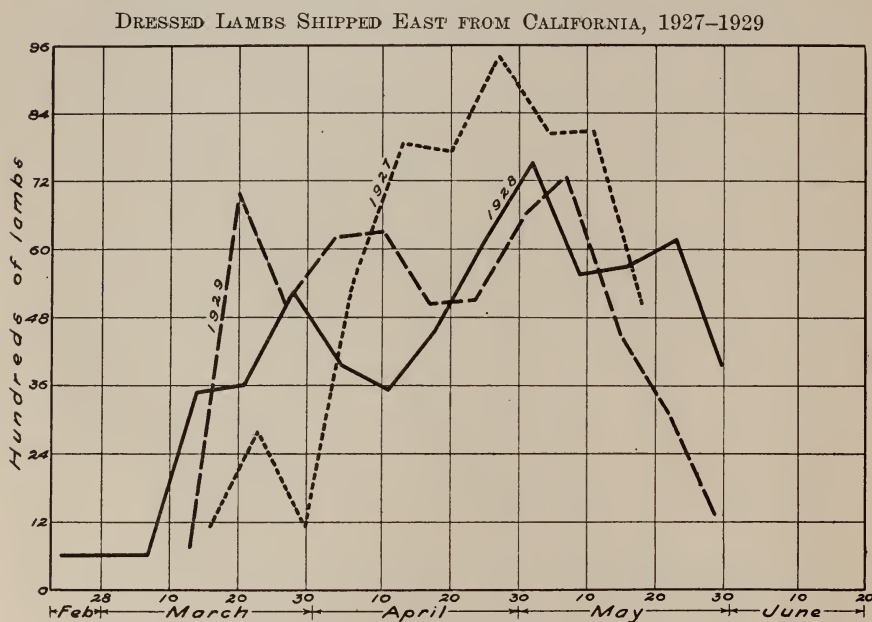


Fig. 28.—The graphs in the above figure represent the weekly movement of dressed spring lambs to the east. The bulk movement is spread over a longer period of time than in the case of live lambs (compare with fig. 27). (Data from table 45.)

independent lamb buyers, who either act as representatives of mid-western killers, or who purchase with a view of re-selling. These large lamb shippers or eastern buyers buy, sort, and load the lambs, order the cars, and control the movement of their purchases to the various markets by diverting or withholding shipments according to their information, judgment, and experience.

A written contract usually is accompanied by a deposit of \$1.00–\$3.00 per head and includes a statement as to the number of lambs to be delivered between certain dates, usually at two-week intervals. The contract is generally drawn up after the prospective buyer inspects the band and agrees with the owner as to the price to be paid on delivery at the nearest scales or local shipping point.

In 1928 considerably more than three-fourths of the total out-of-state shipments were handled by California slaughterers and larger lamb buyers or mid-western shippers. A relatively small portion are shipped direct to mid-western markets by growers, because the individual grower either prefers to sell at home or feels that he cannot spare the time to make the trip or does not have sufficient lambs ready at any one time to enable him to ship in double-deck cars. It is the practice of some early-lamb producers to hold over the 'tail-end lambs' in California until the next season, when they are marketed as yearlings, and moved with the spring lambs to mid-western markets.

Usually the bulk of the Sacramento Valley lambs are delivered during the period between April 20 and May 15. The peak of the movements is in May (fig. 27). During the early spring, summer, and fall months before and after the major portion of the early California crop is marketed and even to some extent during the main lamb-shipping season, additional supplies become available in scattered localities. Oftentimes in such cases the individual grower has experienced difficulty in obtaining a buyer at the ranch. Either his shipments were too small to invite buyers' attention or the country price offered seemed unsatisfactory. The establishment of public stockyards at Los Angeles, South San Francisco, and Stockton in recent years has provided additional outlets for all grades of sheep and lambs during the entire year.

At these public stockyards sheep are yarded in pens provided with feed and water immediately upon arrival. Usually the grower consigns his offerings to commission men, who sort, display and sell the lambs or sheep to the highest bidder. After the sale is completed the stock is weighed on scales provided by the management, whose yardage charge covers the use of all handling facilities. Freight, in-transit feed charges, feed charge at the yards, yardage, insurance, and commission-house fees for selling are deducted by the commission firm from the gross proceeds of the sale. Rates for these services are regulated by the Packers and Stockyards Administration, United States Department of Agriculture.

Schedules of Rates for Yardage, Feed, and Selling.—Table 48 shows the rates and charges for yardage and feed at a number of leading markets where California lambs are sold. These charges were in effect on June 30, 1927, as shown by tariffs on file with the Secretary of Agriculture. There are also differences in the types of feed utilized at the different markets. Several kinds of hay are generally fed, the price being given, however, for that kind which is most generally used at the market.

Table 48 also shows a schedule of the commission charges for selling straight cars of sheep and lambs which was in effect at a number of markets on June 30, 1927. This does not represent the complete schedule of rates and charges, in many cases tariffs making provisions for separate charges for buying and selling mixed-car lots, drive-in livestock, and plural-ownership consignments of livestock. In some cases additional charges are made for extra services such as pro-rating, extra sorting, and rendering separate accounts. The charges set forth in each instance represent those observed by most of the agencies at the various markets.

TABLE 48
STOCKYARD CHARGES FOR YARDAGE AND FEED

Stockyards and address	Yardage per head	Feed		Rates for selling	
		Hay per 100 lbs.	Corn per bu.	Single decks	Double decks
Union Stockyards, Chicago.....	\$0.08	\$1.90	\$1.55	\$14.00	\$20.00
Kansas City Stockyards, Kansas City, Mo.....	.08	1.37½	1.45	14.00	20.00
Union Stockyards, Denver, Colo.....	.08	1.50	1.50	14.00	20.00
Union Stockyards, Los Angeles, Calif.....	.08	1.80	1.80	14.00	20.00
Union Stockyards, Ogden, Utah.....	.05	1.40	3.00‡		
Union Stockyards, Omaha, Neb.*.....	.08	1.45	1.45	14.00	20.00
Union Stockyards, North Portland, Ore.....	.07	1.75		12.50	18.75
Union Stockyards, North Salt Lake, Utah.....	.05	1.50	3.00‡		
Union Stockyards, South San Francisco, Calif.....	.08	1.75	3.50‡	14.00	20.00
Union Stockyards, Stockton, Calif.....	.08	1.25	3.00‡		
St. Joseph Stockyards, St. Joseph, Mo.....	.08	1.37½	1.45	14.00	20.00

* Any interested agency may file a petition or complaint with the Secretary of Agriculture requesting inquiry as to the reasonableness of tariffs. Such proceeding is now being conducted by the Omaha Live-stock Exchange, March 1929.

‡ Price per hundredweight.

Source of data: Chief of the Packers and Stockyards Admin. An. Repts. of the U. S. Dept. Agr., pp. 1-38. Aug. 25, 1927.

Lamb Shipping Losses.—Many shippers maintain that the largest death loss in shipping lambs east occurs during the first 24 hours (usually from California loading points to the first unloading station). No definite data are available by which the authors could check this opinion. The questioning of a number of caretakers and shippers partially confirms this. Because spring lambs have not been used to handling in livestock trains when first loaded they are inclined to ride standing up, especially during the first 24 to 36 hours. After they become adjusted to the side-swaying and novelty of the situation they are inclined to lie down. Experienced care-takers work the car with a prod-pole to keep the lambs from piling up at the forward

end at every stop during the first two days of the journey and under normal road operating conditions the lambs will soon learn to lie down and rest easy during the balance of the six or seven day journey to mid-western markets.

Careless care-takers of livestock usually experience heavier losses than do active workers who watch the riding of the lambs. Some losses are reported from water founder, or access to too much water at unloading stations, after a dusty and hot journey. Many shippers prefer to water at corrals having a water-trough by which the amount of water each lamb receives can be regulated rather than to water at a running stream where no indication of the amount of water consumed can be ascertained. When lambs are exceedingly thirsty they tend to over-drink. Some losses in transit are chargeable to 'strange' hay, that is, hay to which the lambs have not been accustomed, and most operators specify good clean, bright, leafy alfalfa hay as distinct from woody, stemmy hay lacking leaves.

On account of the large number of lambs shipped from California during a short season the capacity of feed yards enroute to mid-western markets is often taxed, causing abnormal losses. During the 1929 season lambs coming from a temperate climate in California were subjected to severe snow storms, muddy corrals, high winds and lack of shelter. Obviously the shrink in many cases was severe.

Weighing Conditions.—Conditions under which sheep and lambs are weighed vary considerably. With fed lambs in feed lots during the winter months the common practice is to allow the feeder to give a morning feed, after which the lambs are taken to the scales. A deduction of 4 per cent is usually allowed in such cases and the net weight after deduction is the selling weight.

During the spring and summer it is the custom at many ranches to drive the ewes with their lambs to enclosures near the scales. The buyer and seller separate the ewes from the lambs, driving the latter on the scales. A deduction of 3 per cent is usually made. In cases where it is necessary to drive 8 or 10 miles to the nearest scales it is not uncommon to drive the ewes and lambs to corrals close to the scales, where the animals are bedded down for the night. The next morning the ewes are separated from the lambs, the latter being weighed. The buyer usually demands a 2-per-cent deduction. In lieu of this method the lambs are often separated at night and allowed access to neither feed nor water, weighing taking place early the next morning. This latter method of weighing is designated as "a 12-hour

stand without feed or water." Occasionally 5 to 15-mile drives are made without the ewes, and the lambs are weighed immediately upon arrival, no deduction for shrinkage being made. The activity of the lamb market will govern the weighing basis to a considerable extent.

It is natural that there should be considerable variation in the number loaded per deck with the different weights of sheep and lambs. A relation exists between the season of the year during which lambs are marketed and the number loaded per deck. During the fed-lamb season (January and February) probably only 135 to 140 head of from 85 to 100-pound lambs can be loaded to a single deck. During the spring-lamb season one experienced buyer loads 140 to 145 head of 75 to 80-pound lambs to a single deck, or 280 in a double deck.

A check of the number of single decks and lambs arriving at Ogden, Utah, during the 1928 California spring-lamb season gave 147.8 head per deck. Mr. G. A. Scott, Bureau of Livestock and Crop Estimates, Sacramento, Calif., checked the number of decks and lambs at Ogden during the California season of 1927 and found an average of 142 to the single deck.

According to Mr. George Cleary, a lamb shipper of San Francisco, Calif., there are livestock cars of different sizes in the Pacific Coast area ranging in length from 35 ft. 9 in. to 40 ft. One line which handles the bulk of California lamb shipments to midwestern markets generally utilizes 36 ft. 6 in. cars in which approximately 145 head of 75 to 80-pound lambs can be loaded.

Near the close of the California movement a considerable number of feeder lambs are shipped and instances are known of 150 to 155 head of 55 to 60-pound feeder lambs having been loaded to a single deck for midwestern markets.

Cost of Shipping Live Lambs.—Estimates on the costs of shipping lambs to market are made on a per-head or on a hundredweight basis. Buyers, sellers, and students of the industry are greatly interested in shipping costs. This subject causes considerable controversy. It is seldom that all the factors, such as home weights, selling weights, loss by shrinkage, death loss, and feed and transportation charges, are actually known until after the movement is completed. There is therefore variation between costs of shipments during the same year and more noticeably between those of different years.

Many large buyers figure care-takers' wages and expenses at 15 cents a head on all lambs shipped, in addition to other shipping costs. Cuts have been made in shipping costs by eliminating care-takers,

making arrangements at feeding stations for care en route. The total cost of shipping to any of the Missouri River markets averages about \$1.33 per head (1925-1929) exclusive of shrinkage. Average shrinkage in transit to midwestern markets amounts to 5 to 7 pounds per lamb or 10 per cent of the live weight, the greatest shrinkage occur-

TABLE 49
ESTIMATED APPROXIMATE LIVE-LAMB SHIPPING COSTS*
(Double-deck cars)

From mainline California points	To Denver	To river markets	To Chicago
Freight rate.....	\$201.00	\$257.00	\$304.00
Sanding car at loading point.....	1.50	1.50	1.50
Terminal charges per car (estimated).....	0.75	0.75	0.75
Yardage (280 lambs) at 8 cents a head.....	22.40	22.40	22.40
Selling commission.....	20.00	20.00	20.00
Feed at stockyards (estimated).....	15.00	15.00	15.00
Feed en route per car*:			
First feed.....	8.00	8.00	8.00
Second feed.....	10.00	10.00	10.00
Third feed.....	12.00	12.00	12.00
Fourth feed.....		22.00	22.00
Fifth feed.....			22.00
Other charges:			
National Meat Board (optional).....	0.05	0.05	0.05
National Wool Growers (optional) (1 cent a head on all lambs sold).....	2.80	2.80	2.80
Total per double deck.....	\$293.50	\$371.50	\$430.50
Cost per head (280 lambs per car).....	1.05	1.33	1.54

* Feed costs are exceedingly variable, depending upon quantity consumed and market values at each station. The above figures are averages taken from shippers' account sales during the season of 1925, and are given as an indication of items to be considered.

† River markets include Omaha, Kansas City, and St. Joseph, Mo.

Source of data: California Wool Growers Assn., San Francisco, Calif.

ring in the first 24 hours.⁶² If the original cost is \$10.00 per cwt., average shrinkage will amount to between 50 and 75 cents per head, whereas if the cost is \$12.00 per cwt., it will amount to between 60 and 84 cents per head. The more important costs involved in shipping live California lambs to midwestern livestock markets appear in table 49.

Destination of Live Lambs.—Shipments of live lambs move to the large markets of the middle west (table 50). After slaughter it is estimated that approximately 90 per cent are sent dressed to cities

⁶² Some difference of opinion exists relative to the amount of shrinkage. One large shipper considers the average shrinkage stated above to be too low. Another shipper of over 100,000 head in 1928 states "With a normal country shrink we figure a 10 per cent shrink from California east."

east of Pittsburgh.⁶³ Of these, one-third are sent to New York, a second third to Philadelphia, and the remainder to Boston and adjacent New England points. Thus California dressed lambs come in competition with mid-western dressed lambs on the Atlantic Coast markets. It is significant to note that California live lambs have been re-shipped to Boston, New York, and Philadelphia for Kosher slaughter, having changed ownership at Omaha and Chicago livestock markets.⁶⁴

TABLE 50
PRINCIPAL MARKETS FOR CALIFORNIA LIVE LAMBS, 1920-1929
(Number of live lambs received)

Year	Chicago	Omaha	St. Joseph	Denver	Kansas City	San Francisco	Los Angeles
1920*	84,000						
1921*	80,000					264,000	175,000
1922*	65,000	104,005				254,000	185,000
1923*	53,051	143,725	29,613	22,960	7,009	253,100	232,000
1924*	Foot-and-mouth disease quarantined					314,000	235,000
1925†	129,000	74,589	30,600	8,100	17,026	280,000	250,000
1926†	72,100	51,105	39,158	7,000	18,547	259,000	250,000
1927†	203,058	130,065	27,764	11,627	24,187	250,000	250,000
1928†	202,000	132,066	27,830	15,680	23,592	210,178	180,835
1929†	265,900	138,968	37,846	26,704	5,398	200,000	195,000

* NOTE: 1920-1923 data are not available for all principal markets.

† In addition it is estimated that 10 per cent should be added to the totals for shipments not included in the table.

Source of data: U. S. Dept. Agr., Bur. Agr. Econ., San Francisco, California.

Dependable data on distribution of live lambs prior to 1922 are not available, but a survey of the 1923 marketings indicates that approximately 56 per cent of the total number shipped out of the state were sold at Omaha, 21 per cent at Chicago, 12 per cent at St. Joseph, 9 per cent at Denver, and 3 per cent at Kansas City. The first two have continued to be the more important markets, although Kansas City and Denver have received increased shipments since 1923 (table 48).⁶⁵ A number of cars have been sent to North Portland, Seattle, Tacoma, and Reno.

⁶³ Information to W. P. Wing, Sec. California Wool Growers Assn., from Cudahy & Co., Chicago, Ill.

⁶⁴ There are differences of opinion among shippers concerning the advisability of this practice. Some believe that these live lambs generally do not hold up very well after they have passed Chicago, while others do not consider that there is much difference in the quality and dressing of lambs shipped to New York and to Chicago.

⁶⁵ Information to Federal-State Market News Service from branch offices, Livestock, Meats and Wool Division, U. S. Dept. of Agr. those cities.

Available data for 1926, 1927, and 1928 show that between 5 and 10 per cent of the lambs shipped were sold as feeders. A considerable number of these have been sent to feed yards in Michigan and Illinois, appearing on the markets for slaughter during June and July. (Table 47 shows total out-of-state shipments.) Some feeding is done at Omaha and Kansas City adjacent to the stockyards by men who make a business of feeding lambs—usually not by packers.

The local markets of San Francisco and Los Angeles receive the bulk of the lamb crop, estimates in 1926 accounting for two-thirds of the crop, in 1927 for one-half, in 1928 for slightly less than half, and in 1929 slightly more than two-fifths. In addition to these two larger state markets, considerable numbers are sent to other markets within the state, as may be seen by data on state-inspected slaughter at other points than Los Angeles (table 21).

The distribution of the 1928 early California lamb crop was probably the widest on record. The total shipments for the spring lamb season (Mar. 15 to June 15) were:

Market	Slaughter lambs	Feeder purchases	Total	Approximate number single decks	Per cent to each market
Chicago.....	191,600	10,400	202,000	1,443	23.2
Kansas City.....	23,592		23,592	168	2.7
Denver.....	15,680		15,680	112	1.8
St. Joseph.....	22,330	5,500	27,830	200	3.2
Omaha.....	110,066	22,000	132,066	943	15.2
San Francisco.....	210,178		210,178	1,500	24.1
Los Angeles.....	180,835		180,835	1,300	20.8
Unknown.....	78,178		78,178	560	9.0
Total.....	832,459	37,900	870,359	6,226	100.00

The above data for Denver included 19 double decks which were later shipped eastward. Minor markets such as Reno, Ogden, Portland, Seattle, Tacoma and numerous cities within the state received small shipments of spring lambs during this period.

An opinion has been expressed that with the increased buying of spring lambs for eastern shipment by four large packers in California, the percentage of these lambs to be killed in Chicago will be greatly increased and the percentage killed at Denver, Omaha, St. Joseph, and Kansas City will be lowered, Chicago being closer to the consuming centers on the eastern seaboard.⁶⁶

⁶⁶ George J. Cleary, San Francisco, California, in letter to Edwin C. Voorhies, Feb. 15, 1929.

Dressed-Lamb Marketing.—The movement of dressed spring lambs from California to Atlantic Coast markets was begun in an experimental way in 1918 by a large slaughterer, who maintains a plant at South San Francisco. A few carloads were sent to the Atlantic Coast markets during March with the idea of having California spring lamb on sale before Easter. These early shipments met with ready sale and each succeeding year the movement has increased. During 1923 about 35 express refrigerator carloads were sent. Leading lamb shippers state that the shipment of dressed lambs out of California is resorted to largely to supply the eastern demand and often is found necessary because the lambs which are so shipped are generally not old enough or mature enough to ship east without running the risk of loss of quality en route.⁶⁷ The cost of shipping dressed lambs across the country resulted in rather narrow margins to the packer because of the relatively high express rate. More recently, however, joint action has enabled the carriers to reduce this rate. It was demonstrated that 'good to choice milk lamb' could be en route seven days and placed on the market at a time when the major portion of supplies were fed lambs.

In 1924 because quarantines prevented the movement of live lambs out of most of California those slaughterers operating under federal inspection shipped dressed lambs in express refrigerator cars and saved the situation for the California spring lamb producer. This indicated the great importance of federal inspection in the state to take care of such an emergency. The price received by the grower in most instances was equal to that of the year previous, due to a considerable extent to the cooperation of railroads and express companies in giving emergency rates in moving the live and dressed lambs to market points. (See p. 95.)

The style of dressing for eastern markets is somewhat different from that commonly practiced on the Pacific Coast. Experienced operators dress the lambs, 'pluck out' (heart, liver, lungs, windpipe), drop the neck to allow drainage and aeration, do not split open the breast bone, and the lambs are dressed without back-sets or caul attached. As a rule only choice carcasses weighing under 38 pounds, neatly wrapped in clean white muslin bags are shipped. Most concerns plan to have their lambs arrive in New York for unloading during the forepart of each week.

⁶⁷ Letter from George J. Cleary, San Francisco, California, to Edwin C. Voorhies, Feb. 15, 1929. Statement confirmed by letter from Forrest Taylor, Western Meat Co., San Francisco, to W. P. Wing, Secretary, Calif. Wool Growers Assoc., Feb. 23, 1929.

At the height of the season as many as two or three express refrigerator cars of lambs leave in a day, which are attached to the fastest transcontinental passenger trains.

Dressed-Lamb Marketing Costs.—The following represent average costs of marketing dressed spring lambs through refrigerator car shipments during the 1925 season:

	<i>Per 100 pounds</i>	
Good to choice 70–75 lb. lambs, f.o.b. ranch.....	\$12.00—	\$12.50
Shipping cost ranch to plant including 5 lbs. shrink, freight, sand- ing car (roughly estimated)	1.00—	1.00
Average cost off cars at plant, Pacific Coast.....	13.00—	13.50
Express charges, plant to Atlantic Coast (dressed).....	4.28—	4.28
Icing, packing, shrinkage, bagging, commission on selling dressed lambs (roughly estimated).....	2.00—	2.25
Total shipping cost for dressed animals (average estimated).....	\$ 6.28—	\$ 6.53

The cost of delivery to eastern markets ranged between \$6.00–\$7.00 per 100 lbs., depending upon the size and number of carcasses loaded per car. Of about 175 cars loaded at San Francisco, the number averaged practically 646 lambs per car, while 112 cars shipped from Los Angeles averaged 596, indicating perhaps that the former market practiced stricter plant grading and shipped only the choicest under-40-pound carcasses. In general, the smaller lambs commanded the top of the market at the Atlantic Coast.

Distributing Dressed Lambs.—After the dressed lambs leave the slaughtering plant in California the head offices of the shippers keep in constant communication with eastern Atlantic Coast markets, diverting the express cars to various markets, principally New York, Boston and Philadelphia.

In order to have California spring lambs sell profitably on Atlantic Coast markets, it is absolutely essential that they be in good condition. Even high-conditioned stock which has been shipped so far must be sold soon after arrival, and obviously, low-conditioned stock must be sold at once and not infrequently at a sacrifice. Desirable weight is also essential. Heavy spring lambs of similar grade frequently sell practically in line with fall lambs. California lambs will sell most readily if they hold closely to the desired mutton conformation, buyers criticizing offerings of some seasons as being uniformly rangy and decidedly coarse, and not accepting the meat as genuine spring lamb from California.

Opinions differ among California slaughterers as to the economy of marketing dressed lambs at Atlantic Coast markets. On the whole the more experienced shippers seem to have had reasonably good success by carefully grading their products and using the other grades on local markets. Sorting for eastern shipments apparently cannot be too severe. Naturally some shippers are more careful than others in this respect, but lack of proper selection almost always brings a penalty in the form of lower price. One operator who shipped a comparatively small number of cars maintains it is hardly practical to ship dressed lambs from California, as it is difficult to have the carcasses reach Atlantic Coast buyers before they become slick or drip with moisture. When once the lambs become slick, buyers note their appearance and reduce their bids \$3.00–\$4.00 per cwt., and if trade is draggy, it may result in considerably lower prices than anticipated.

The Philadelphia market during 1928 received 17 carloads of dressed lambs, as compared with 17 cars in 1927, 22 cars in 1926, 8 cars in 1925, and 23 cars during 1924. A prominent chain-store system which operates 492 retail chain meat markets bought a considerable portion of these lambs in 1928 and made a feature of 'California baby lambs' in its advertising during March, April, and May.

The Boston market received only 2 carloads in 1928, returns being such that continuous shipment was not advisable; during 1927 only 5 cars were received and during 1926, 6 cars.

The New York market receives a major portion of supplies shipped from California. During 1928 this metropolitan area received 53 cars, in 1927 about 55 cars, in 1926, 48 cars.

During 1927 New York received a few carloads of dressed lambs by fast freight from South San Francisco. On opening the cars in New York City a very strong odor was present. The lambs were sticky on the flanks and wet and slightly discolored in the crotches, the muslin bags stuck to the legs in some places and were decidedly out of condition. These lambs were the right kind for shipping, weights being satisfactory and quality equal to anything received from California that year. However, the cars were in transit twelve days, which, of course, means that they were not moving part of the time and when parked between long lines of freight with comparatively little air, the situation was right for the production of stale meat.

Cities and towns east of Chicago which cannot handle a complete carload of spring lambs are served by 'peddler cars' or mixed cars

of fresh meats which contain a dozen or two lambs. Lambs are loaded into these cars at Chicago, having moved from the Pacific Coast by express.

Marketing Methods Compared.—The majority of the 1923 crop of lambs marketed at mid-western markets was shipped east as live lambs. In the following year (1924) necessity compelled the bulk of lambs to be moved in the dressed condition. The years 1925–1928 witnessed a rather general return to the policy of shipping the bulk of the lambs out of California, alive (figs. 27 and 28). This was chiefly because more competition could thereby be obtained in middle western markets, not only on desirable fat lambs but on feeder lambs as well.

The present tendency in California is to market the entire lamb crop as spring lambs, and during recent years a greater proportion has been sold early than in any other state.

Concerns who have had experience in shipping by both methods believe that less financial risk is involved in shipping live lambs to middle western markets than the more costly dressed lambs to Atlantic Coast markets under present methods and freight rates.

Feeders Shipped Out of the State.—The bulk of the lambs usually shipped out of the state are in condition for immediate slaughter. Along with the spring-lamb shipments, however, is an appreciable number of lambs which are sold as feeders on the middle western markets. On account of inadequate data it is difficult to estimate the percentage of feeders for eastern shipments. It is probable that these have constituted from 6 to 28 per cent of the eastern shipments made during the three months March 15 to June 15. Few California sheepmen are in a position to feed; many prefer to sell all of their surplus stock at one time. The largest number of feeders from California are handled at Omaha, with Chicago as the second market. These feeder lambs are usually sheared, placed on dry feed, and finished in from sixty to ninety days.⁶⁸

During the late spring or early summer, Washington buyers go to the Sacramento Valley to purchase ewes for feeding purposes. These are shipped to feed yards adjacent to packing plants in the northwest and marketed there. Imperial Valley buyers are during some years large purchasers of old ewes in the early lamb producing sections of the state.

⁶⁸ Letter from Wm. R. Smith & Son., Chicago to authors, Oct. 22, 1928.

TABLE 51
SHEEP AND LAMBS SHIPPED INTO CALIFORNIA 1924-1928
(Single decks)

State of origin	1923	1924	1925	1926	1927	1928												
						Total	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Arizona.....	464	288	869	1,062	643	632	20	128	110	46	17	11	36	42	55	28	68	71
Colorado.....			13			9	7							2				
Idaho.....	578	632	490	329	459	571	100	109	29			1		5	54	37	124	112
Iowa.....	14																	
Kansas.....					6													
Mexico.....						6				6								
Montana.....	13			15		35				4				7	19	1	4	
Nebraska.....	16																	
Nevada.....	646	804	571	1,198	929	866	49	54	10	23	15	15	72	43	283	131	24	147
New Mexico.....	119		28		6													
Oklahoma.....					11													
Oregon.....	565	590	930	966	1,361	1,198	34	13	6	2	4	206	212	106	303	107	102	103
Texas.....	53		159	222	309	126		24	30		4					66	2	
Utah.....	890	998	422	409	466	891	126	136	76			2	4	22	113	187	99	126
Washington.....		30	18	10	9													
Wyoming.....	14					17			1					1	6	8	1	
Total.....	3,372	3,337	3,504	4,211	4,199	4,351	336	464	262	81	40	235	324	228	833	565	424	559

NOTE. Isolated cars of pure-bred stock are not included in the above totals.
Source of data: Calif. Wool Growers Assoc., San Francisco, Calif.

SHEEP SHIPPED INTO CALIFORNIA

Total Shipments.—During the spring of the year the state has a surplus of lambs, but for the remaining months sheep must be shipped in from outside states. Although California has a dense sheep population (fig. 6), the per-capita consumption of lamb and mutton is high (p. 51). Considering only total shipments both in and out of the state, a net balance of approximately 150,000 sheep has been sent in from the outside in order to supply the demands. To conclude from this that a larger sheep population is desirable would be fallacious. It will be realized more and more that the state cannot be separated from the surrounding territory in considering many crops and products.

TABLE 52

MONTHLY SHIPMENTS OF SHEEP AND LAMBS INTO CALIFORNIA, 1923-1928
(Single decks)

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1923	404	304	121	29	19	29	154	321	411	672	561	347	3,372
1924	390	404	356	44	5	41	142	184	437	615	406	313	3,337
1925	415	489	219	48	71	123	195	284	509	637	293	221	3,504
1926	427	420	200	51	40	130	304	361	1026	728	190	334	4,211
1927	295	301	211	61	81	179	459	317	843	587	478	387	4,199
1928	336	464	262	81	40	235	324	228	833	565	424	559	4,351

Source of data: Calif. Wool Growers Assoc., San Francisco, Calif.

Equally erroneous would be the conclusion that these sheep are used entirely for slaughter purposes. Many operators in the early lamb producing sections of the state believe that it is more economical to buy young ewes rather than to hold over their ewe-lambs and grow them out for breeding stock. A number of sheepmen make a practice of buying ewe lambs or yearlings in other states, winter them in California and sell them later. This is a regularly established business and the turnover is estimated to be from 100,000 to 200,000 head per year. These sheep are purchased mainly in Oregon, Nevada, Idaho, and Utah.

Oregon, Nevada, Arizona, Idaho, and Utah furnish over 90 per cent of the sheep shipped into the state (table 51). During the five years, 1924-1928, the first two states have supplied approximately one-half of these arrivals. Occasional shipments of sheep for slaugh-

ter have been sent from the western section of the Mississippi Valley and Texas. Breeding animals have been received from all parts of the country.

Like the outward movement, incoming shipments are highly seasonal. The heaviest shipments into the state are made during September, October, and November, although movement begins soon after the first of July and usually continues through March, until the local spring lambs come on to the market. During the three months (September–November) between 40 and 50 per cent of the year's outside offerings are sent in (table 52), consisting largely of fat and feeder lambs from the inter-mountain territory. Fed lambs arrive from the same area during January, February, early in March, and often December.

*Sheep Shipped into California for Grazing.*⁶⁹—The Division of Animal Industry of the State Department of Agriculture has attempted to differentiate between sheep entering the state for feeder and for grazing purposes, although the line of demarcation is difficult to make. From the data for 1925–1928, it is evident that there has been considerable decline in incoming shipments of grazing sheep. Available feed is the main determinant for the carrying capacity of the ranges. Although records indicate that sheep for grazing purposes have been shipped into the state during every month of the year, by far the larger number cross the state lines in the spring, especially during March and April. During the past four years all of these sheep entered from southern Oregon and northwestern Nevada, the greater part having the northeastern mountain counties as their destination.

*Feeder Sheep Shipped into California.*⁷⁰—Records of feeder and grazing sheep entering California are available since 1925. Since this date there has been a decided increase in the number of feeder sheep entering the state. The movement usually begins in September or October during which time one-half to two-thirds of the total number cross the state's borders. Although California produces fewer lambs than are consumed in the local markets, such a general statement is of but little significance. The bulk of the lamb crop is produced

⁶⁹ For information with reference to the range types of California the reader is referred to: Voorhies, Edwin C., and A. B. Koughan. Economic aspects of the beef cattle industry. California Agr. Exp. Sta. Bul. 461:33–37. 1928.

⁷⁰ The authors are indebted to Dr. J. P. Iverson, Chief of the Division of Animal Industry, California State Dept. Agr., for data on the movements of feeder and grazing sheep into the state.

during the spring months (p. 53), hence the seasonality of lamb production is a factor of prime importance. By the end of June the larger part of the spring crop of lambs is gone and local markets must look elsewhere for supplies. Although there are sections where lambing takes place at a late date (p. 53), local supplies are not sufficient to supply the demand. In addition to fed lambs sent to local markets, feeders are also shipped, which are placed on stubble fields and feed lots. Arizona, Nevada, Oregon, and Texas, in the order named, have furnished the largest shipments of feeders with occasional offerings from Utah, Idaho, New Mexico, and Montana.

REQUISITES FOR EARLY LAMB PRODUCTION⁷¹

Some of the requisites in successful spring-lamb production are (1) proper type of ewe and ram, (2) favorable climatic conditions, and (3) ideal feed supply.

Proper Type of Ewe and Ram.—In California the majority of range ewes are of grade Rambouillet or Merino type, although in many bands a percentage of crossbred (black-faced Merino) ewes is found. The more progressive sheepmen interested in the production of spring lambs have lately introduced about one-fourth long-wool blood crossing with Romney or Lincoln rams. The Corriedale and Romeldale crosses are also favored where it is desired to retain the ewe lambs for breeding stock. These crossbred ewes are superior milkers to the straight Rambouillet type and are therefore favored by some sheepmen. The great advantage of the Rambouillet ewe, however, is that she is not only very hardy but also early lambing, breeding as early as June and July for November and December lambs. Mutton-type ewes, and to some extent crossbred ewes, do not possess the early-breeding faculty so desirable in this industry.

The ewes are mated with one of the standard mutton sires—Hampshire, Shropshire, Suffolk, or Southdown—to insure good mutton-type, early-maturing lambs. The Hampshire and Shropshire have in the past been the more popular sires, although there is interest at present in the possibilities of the Suffolk as a sire in producing early-maturing lambs. The Southdown is also gaining favor, particularly

⁷¹ On account of the importance of maintaining proper quality in spring lambs, requests have been made by sheepmen to include this section in the publication. Associate Professor R. F. Miller, Associate Animal Husbandman, California Agr. Exp. Sta. has prepared pp. 119–121.

in the north coast counties, where the winters are more severe. The lambs in this region, however, are not dropped until February and would hardly classify as early lambs.

The larger type of rams, such as Hampshire and Suffolk, are especially well adapted to range conditions where early spring feed is plentiful. Under these ideal conditions the lambs resulting from this cross develop very rapidly and at a given age outweigh Shropshire or Southdown crossbred lambs by 5 to 10 pounds. The chief aim should be, however, to provide choice spring feed in order to dispose of all of these as early spring lambs. If they do not fatten as early lambs, they become large, rangy, summer lambs and do not prove desirable feeder lambs. They do not fatten readily and when finally in market condition are too heavy for the coast trade, weighing 90 to 95 pounds.

The Shropshire sire is well adapted for crossbreeding under farm conditions and also preferred by many range sheepmen, particularly where early range feed is not ideal. The lambs are somewhat smaller and more compact than those sired by Hampshire or Suffolk rams, and for that reason will fatten more readily and also prove desirable feeder lambs in case they do not mature for the early lamb trade.

What has been said of the Shropshire also applies to the Southdown as a sire. However, Southdown crossbred lambs are often criticized for lacking in weight as compared to the larger breeds, and for that reason they have not become more popular in this state. For farm conditions they have proved very satisfactory and in the early lamb sections of Kentucky, Tennessee, and Virginia, Southdown rams comprise 60 to 70 per cent of the sires used.

Favorable Climatic Conditions.—Climatic conditions are a factor because the lambing period comes during the winter months of November, December, and January. Some sheepmen provide special lambing sheds where each individual ewe is cared for with her lamb in a small pen for one or two days, yet a great many sheepmen lamb on the open range in sheltered places afforded by ravines and timbered areas. The former method requires considerable labor and a special supply of feed and bedding in the form of alfalfa hay and straw, and special attention to sanitation. For these reasons the open-range type of lambing is preferred by most sheepmen.

Feed Supply.—The natural feed supply is no doubt the most important item in the successful production of choice lambs. It is highly important to have green feed at lambing time, so as to insure

a good flow of milk for the lamb. Sheepmen who lamb as early as October and November usually depend on alfalfa pasture for green feed; foxtail grasses and alfilaria are seldom available until December. Seasonable rains in early fall and during the winter are essential to produce a continuous growth of green feed, and in the spring months of February, March, and April, an abundance of alfilaria and bur clover is found in leading early-lamb regions, crowding the lambs to maturity and market weight at an early age. The green grass usually lasts until the middle of May, when it begins to dry. The seeds of foxtail, bur clover, and alfilaria, when dry, affect both pelts and carcasses. These seeds often push through the pelt, causing small blood clots, which have the appearance of needle points on the carcass. If a pelt contains these punctures it lessens its value because it is necessary to remove the spots by knife trimming, thereby detracting from the appearance. Often the wool containing the seeds must be carbonized in the process of scouring, which entails additional expense. Both dressed-lamb and live-lamb buyers heavily penalize all lambs affected. Growers should aim to market the lambs before infestation occurs.

Attempting to produce lambs at a too-early period—in October, and marketing in March—is not usually advisable owing to a scarcity of green feed at lambing time and the danger of encountering a heavy supply of lambs from country feed lots with resulting low prices. The April and May markets are usually better, because the feed-lot lambs are practically all shipped by April 1 and the supply of lambs is more or less limited, resulting in a brisk market.

The production of spring lambs is likely to increase as more sheepmen engage in the business. Quality is of prime importance in the spring-lamb trade, and the California grower should strive to produce better lambs rather than more lambs.

GRAZING AND FEEDING SHEEP

Grazing in the National Forests.—National forests occupy a large proportion (19.2) per cent) of the area of California. As a general rule between 400,000 and 500,000 sheep (lambs under 6 months not included) are grazed in these forests under annual or term permits. Permits are obtained by from 300 to 500 applicants (table 54). The importance of the national forests for the entire country can be seen from table 53.

Varying fees are charged for grazing in the national forests of the state. Table 55 contains a list of the fees charged from 1917 to 1928 and those proposed for year-long grazing in 1931. For some years a study has been in progress which has as its ultimate aim a more equable distribution of grazing fees. The new fees will go into effect gradually, starting in 1928 and reaching full operation in 1931.

Favorable prices both in the sheep and cattle industries present problems in the administration of the national forests. One of the main problems is the prevention of overexpansion and overstocking. The system of management practiced is intended to meet the best needs of the range itself, of the related timber, game, water, recreation and other resources and of the dependent ranch property.

TABLE 53

NUMBER OF STOCK GRAZED UNDER PAID PERMIT ON THE NATIONAL FORESTS OF THE UNITED STATES, 1910-1927

Year	Cattle	Sheep	Year	Cattle	Sheep
1910	1,409,873	7,558,650	1919	2,135,527	7,935,174
1911	1,351,922	7,371,747	1920	2,035,432	7,280,584
1912	1,403,025	7,467,890	1921	1,999,680	6,936,377
1913	1,455,922	7,790,953	1922	1,915,113	6,851,690
1914	1,508,639	7,560,186	1923	1,804,274	6,377,759
1915	1,627,321	7,232,276	1924	1,664,087	6,301,308
1916	1,758,764	7,843,205	1925	1,538,942	6,162,263
1917	1,953,198	7,586,034	1926	1,456,858	6,212,657
1918	2,137,854	8,454,240	1927	1,403,192	6,376,838

NOTE: Years 1910-1920 are fiscal and numbers represent the number permitted; 1921-1927 are calendar years and numbers represent animals actually grazed.

Source of data: U. S. Dept. of Agr., Forest Serv., Washington, D. C.

Heavy losses from various causes are suffered by sheepmen both in the national forests and on private ranges. Estimates made of losses on national forests of the United States in 1927 indicate that 21,418 sheep (and goats) were lost by eating poisonous plants and 106,177 from predatory animals, disease and other causes. This loss of 127,595 on the national forests, except from natural causes can be materially reduced by poisonous plant eradication, predatory animal control, etc.

Feeding Sheep in the Western States and California.—During recent years growers and producers favorably situated have taken a decided interest in the feeding of lambs for California winter markets. Prior to the last five years sheep and lamb slaughterers undertook considerable winter lamb feeding in order to insure their plants sufficient stock during the winter months.

TABLE 54

NATIONAL FORESTS OF CALIFORNIA: AREA, STOCK GRAZED, PERMITS ISSUED, 1909-1928; NUMBER OF STOCK GRAZED IN DIFFERENT FORESTS, 1927, 1928

Year	Stock grazed		Permits issued		Net area of national forests in California
	Cattle and horses	Sheep and goats	Cattle and horses	Sheep and goats	
1909	178,454	385,606	2,846	322	28,531,077
1910	172,727	396,724	2,601	305	28,531,077
1911	165,273	382,245	2,449	298	27,830,525
1912	183,244	444,648	2,521	367	27,729,905
1913	184,076	449,105	2,664	377	20,731,777
1914	189,451	433,048	2,696	348	20,527,543
1915	191,337	397,570	2,694	317	20,162,736
1916	194,892	417,052	2,765	326	20,667,758
1917	205,792	465,752	2,913	378	19,348,831
1918	223,798	581,955	3,142	464	19,055,805
1919	218,926	619,812	3,021	551	18,958,004
1920	211,186	528,858	2,834	495	19,038,802
1921	217,687	554,223	2,884	504	19,320,663
1922	207,033	508,986	2,688	453	19,332,426
1923	200,451	468,971	2,502	395	19,297,896
1924	199,290	473,839	2,405	397	19,307,524
1925	170,026	426,028	2,171	355	19,313,492
1926	169,349	417,235	2,140	347	19,334,865
1927	161,297	431,504	1,947	366	19,159,443
1928	158,289	434,898	1,872	365	.....

NUMBER OF STOCK GRAZED IN CALIFORNIA NATIONAL FORESTS 1927, 1928

Forest	Cattle and horses		Sheep and goats	
	1927	1928	1927	1928
Angeles.....	876	801	.....	2,000
California.....	4,989	5,458	17,472	18,265
Cleveland.....	875	955	1,150	500
Eldorado.....	7,452	7,437	16,435	18,513
Inyo.....	8,690	7,831	39,999	35,107
Klamath.....	5,201	4,929	1,430	671
Lassen.....	10,737	10,016	23,963	19,617
Modoc.....	34,215	32,621	88,500	95,281
Mono.....	4,518	4,523	77,866	77,327
Plumas.....	10,657	10,073	52,905	45,825
San Bernardino.....	2,169	2,283	.....	.....
Santa Barbara.....	8,834	9,391	4,767	4,422
Sequoia.....	18,797	17,323	2,000	3,550
Shasta.....	5,558	5,357	20,284	25,147
Sierra.....	13,383	13,637	22,750	25,890
Stanislaus.....	10,287	11,083	13,072	12,975
Tahoe.....	6,122	6,910	41,774	39,268
Trinity.....	8,183	7,661	12,593	10,540

Source of data: U. S. Dept. of Agr. Forest Serv., California District.

Growers formerly exhibited little interest in this type of work. Of late, however, large firms have contracted for bands of feeder lambs and arranged for shipment and placement either in their own or in commercial feed lots. The largest commercial feed lots are found in the vicinity of Stockton, San Francisco, and Los Angeles. There are a number of smaller feeding stations in the Sacramento Valley. In addition to these are a number of scattered feeding stations in

TABLE 55

YEAR-LONG GRAZING FEES FOR SHEEP ON THE CALIFORNIA NATIONAL FORESTS, 1917, 1918, 1919-1927, AND MONTHLY FEES, 1928, 1931

(Cents per animal)

National forest	1917 yearly	1918 yearly	1919-1927 yearly	1928 monthly	1931 monthly
Angeles.....	18.75	18.75	30.00	3.625	5.50
California.....	18.75	18.75	30.00	3.625	5.50
Cleveland.....	18.75	18.75	30.00	3.625	5.50
El Dorado.....	22.50	22.50	35.00	4.125	6.00
Inyo, Main Forest.....	22.50	22.50	35.00	4.000	5.50
White Mountain.....	22.50	22.50	35.00	3.875	5.00
Klamath, eastern part.....	17.50	18.75	25.00	3.250	5.50
Western part.....	17.50	18.75	25.00	3.125	5.00
Lassen.....	20.00	20.00	30.00	3.750	6.00
Modoc.....	18.75	18.75	30.00	3.625	5.50
Mono, Sierra.....	22.50	22.50	35.00	4.125	6.00
Excelsior division.....	22.50	22.50	35.00	3.875	5.00
Plumas.....	21.25	21.25	35.00	4.125	6.00
San Bernardino.....	18.75	18.75	30.00	3.625	5.50
Santa Barbara.....	20.00	20.00	30.00	3.625	5.50
Sequoia.....	22.50	22.50	35.00	4.000	5.50
High Mountain.....	22.50	22.50	35.00	3.750	4.50
Shasta.....	18.75	18.75	30.00	3.625	5.50
Sierra, lower slopes.....	22.50	22.50	35.00	4.000	5.50
Summit.....	22.50	22.50	35.00	3.875	5.00
Stanislaus.....	22.50	22.50	35.00	4.125	6.00
Tahoe.....	22.50	22.50	35.00	4.125	6.00
Trinity, main forest.....	17.50	17.50	25.00	3.250	5.50
New River district.....	17.50	17.50	25.00	3.125	5.00

Source of data: U. S. Dept. Agr. Forest Serv., California District.

different sections of the state. A number of concerns have also fed lambs at Sparks, Nevada, and Ogden, Utah. Besides the major feeding stations, there are others scattered throughout the state.

Lambs in feed lots and on pastures are usually topped each week for current slaughter needs and considerable replacements are made in feed yards during December and January so that the season's total output of lambs is much larger than the estimated capacity. Some of the larger concerns handle 75,000 to 100,000 lambs through feed lots in a single season.

Commercial feed yards are usually operated on a custom basis. Feed is placed in troughs and the owner is billed weekly for the amount fed by yard employees to each individual lot or lots of sheep and lambs. Feeder customers are usually booked for space during the summer. Regular customers usually reserve sufficient space to handle their anticipated needs.

A typical commercial yard usually consists of a large acreage of land with good railroad facilities and spur tracks, sufficient pure water supply, numerous corrals, lanes, branding and cutting chutes,

TABLE 56

ESTIMATED NUMBER OF SHEEP AND LAMBS ON FEED IN FAR WESTERN STATES,
JANUARY 1, 1928-1929

State	1928	1929
California.....	100,000	90,000
Nevada.....	18,000	29,000
Utah.....	105,000	102,000
Idaho.....	106,000	100,000
Oregon.....	40,000	30,000
Washington.....	30,000	30,000
Arizona.....	20,000	10,000
	419,000	391,000

Source of data: Scott, George A. Lamb feeding situation, Jan. 1, 1929. Mimeographed report issued by Regional Livestock Office of the U. S. Bur. Agr. Econ., Sacramento, Calif., Jan. 16, 1929.

and scales for weighing feed and lambs. Good drainage is essential, for muddy feed lots hamper feeding operations and reduce the gains made on stock. Sufficient shelter is usually provided to place all lambs under cover in inclement weather.

The success of feed-yard operations depends largely upon the systematic topping out of fat lambs and ewes and selling on the current livestock market rather than waiting for the top of the winter market.

Most of the San Francisco Bay district wholesalers who feed lambs do so in order to hold their carcass trade rather than to obtain profits during the winter months. Many operators claim that if they could be assured of suitable quality live lambs to meet their requirements they would forego this side-line activity, relinquishing it to growers and commercial feed yards. It is customary to discontinue packer feed-lot operations by incorporating supplies in the in-coming spring-lamb crops.

During the winter of each year, the United States Department of Agriculture makes a survey of the lamb-feeding situation in the entire

PRICE RATIO OF LAMBS AND SHEEP TO BARLEY, CALIFORNIA, 1910-1929

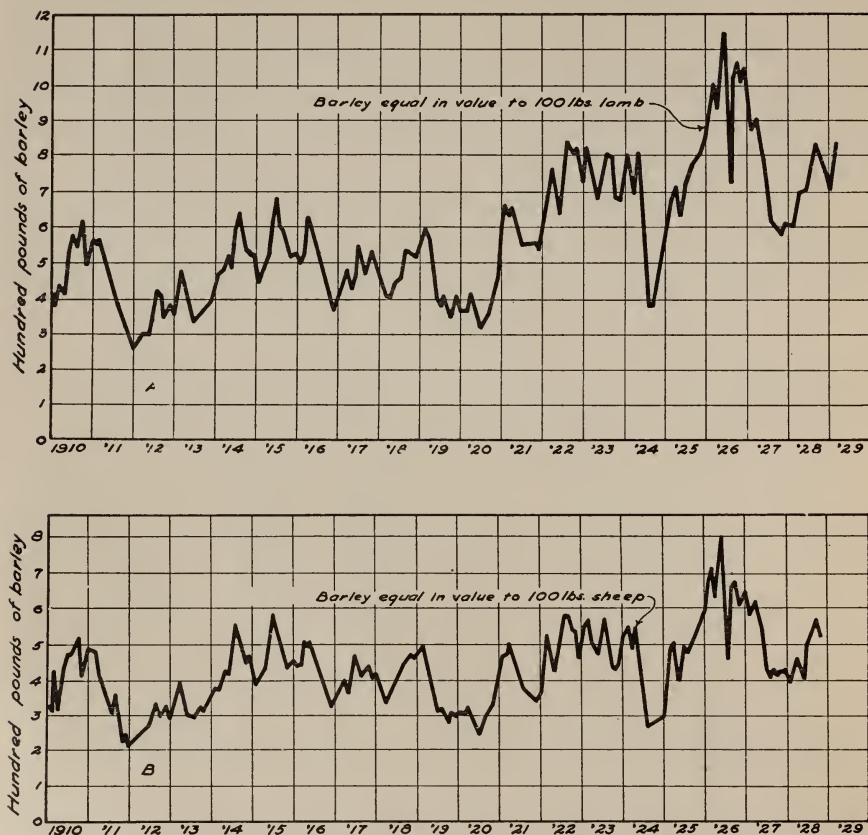


Fig. 29.—The upper part (A) of the diagram clearly depicts the changed relationship between lamb and barley prices which occurred in 1921. Since the latter year (with the exception of 1924) lamb prices have been relatively greater than barley prices if comparisons are made with the years 1910-1920. Sheep prices (B) have not made the same relative gains in terms of barley, as may be seen from the lower section of the diagram. (Data computed by authors from tables 29 and 30, and from monthly prices received by producers for barley. These prices are published monthly in the U. S. Dept. Agr. Crops and Markets.)

country. On January 1, 1929, the number of sheep and lambs estimated to be on feed was 4,715,000 head compared with estimates of 4,463,000 on January 1, 1928, and 4,259,000 head on January 1, 1927. The largest number are fed in the corn belt, the estimates being 2,575,000, 2,186,000, and 2,674,000, respectively, on the above dates. The figures for the western states on the same dates were 2,140,000, 2,277,000, and 1,585,000. Colorado is the main lamb-feeding state of

PRICE RATIO OF LAMBS AND SHEEP TO ALFALFA HAY, CALIFORNIA, 1914-1929

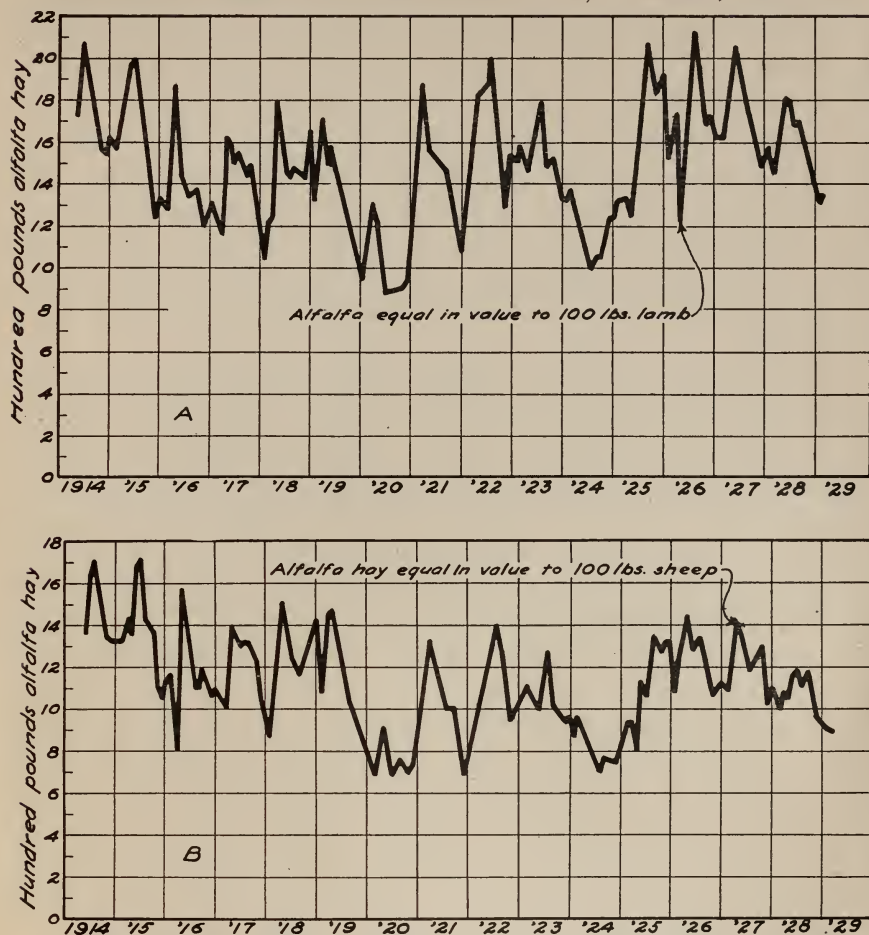


Fig. 30.—Both the upper and lower figures show that from 1914 until 1920 alfalfa hay increased more rapidly in value than either A, lambs, or B, sheep. Since the latter date there has been a tendency for lambs and sheep to be increasingly more valuable in terms of alfalfa hay, so that the feeder using alfalfa has been (1924 excepted) in a favorable position with reference to roughage. (Data computed by authors from tables 29 and 30, and from monthly prices received by producers for alfalfa hay. The prices are published monthly in U. S. Dept. Agr. Crops and Markets.)

the west, there being 1,480,000 on feed on January 1, of the present year against 1,580,000 on January 1, 1928, and 770,000 January 1, 1927. Although there is an apparent trend toward feeding more lambs each winter, on January 1, 1929, the number in California and the far western states was less than that on the same date the previous

year⁷² (table 56). The practice of feeding lambs may possibly equalize the distribution of market lambs and in many cases assist in placing a superior product on the market. There are frequent radical shifts in the distribution and amounts of lamb feeding undertaken.

The price of feed in sections other than California is of interest to the California sheepman. With alfalfa in Colorado and cheap corn in the middle west, there is a tendency for sheep which might have been shipped to California from the mountain states to be sent to feed lots in an opposite direction. When sheep are fed east of the Mississippi River, there is little likelihood of their destination being California.

The Colorado crop of fed lambs is the most important potential competition California producers have to meet. From the standpoint of the California producer and the Colorado feeder it is highly important that the greatest possible cooperation be exercised in making shipments. A study of tables 57 and 58 is worthy of the attention of sheepmen in this state. In the data for 1923 it will be noted that Colorado supplies decreased abruptly during May, leaving the national markets to handle the California crop. No attempt has been made in this table to tabulate the Colorado shipments prior to the opening of the California season. The important fact to observe is the shipments from both Colorado and California after the middle of March. Every year presents a different problem, because climate, feed, and many other conditions are beyond the control of the grower. Even during the shipping season experienced shippers and observers in California find it difficult to forecast with certainty the extent of the movement. Unfavorable weather conditions in California in 1929 forced large numbers of lambs on to the market within a short period of time.

Table 58 gives preliminary data for the 1929 season. The reader should note that the California shipments are given in single decks while those from Colorado are in terms of double-deck carloads. These are the original data as published. The importance of the competition from western feed lots to California spring lambs can be clearly seen from both tables 57 and 58.

⁷² Scott, George A. Sheep and lambs in the 13 western range states. Mimeographed report issued by Regional Livestock Office of the U. S. Dept. Agr., Bur. Agr. Econ., Salt Lake City, Mar. 5, 1928.

Scott, George A. Lamb feeding situation in far western states. Dec. 1, 1928. Mimeographed report issued by Regional Livestock Office of the U. S. Dept. Agr. Bur. Agr. Econ. Sacramento, Calif., Dec. 7, 1928.

Scott, George A. Lamb feeding situation, Jan. 1, 1929. Mimeographed report issued by Regional Livestock Office of the U. S. Dept. Agr. Bur. Agr. Econ., Sacramento, Calif., Jan. 16, 1929.

TABLE 57

LIVE-LAMB SHIPMENTS FROM CALIFORNIA AND COLORADO DURING CALIFORNIA
SPRING LAMB SEASON (MARCH 15-JUNE 15), 1923

California		Colorado	
Week ending	Number head	Week ending	Number head
March		March	
15	5,200	.....	*
23	0	24	146,000
30	11,080	31	114,000
April		April	
7	13,440	7	132,000
14	8,820	13	114,000
21	8,120	20	97,000
28	12,600	27	84,500
May		May	
5	37,800	4	62,000
12	60,200	11	31,700
19	63,840	18	10,300
26	52,000	26	9,600
June			
2	12,600		

* During the period Jan. 1-Mar. 17 Colorado shipped 769,700 head.

Sources of data: California shipments from table 44, p. 00. Colorado shipments compiled by C. L. Harlan, Investigator in Marketing Livestock for the U. S. Dept. Agr., Bur. Agr. Econ.

TABLE 58

LIVE-LAMB SHIPMENTS FROM CALIFORNIA AND COLORADO* DURING CALIFORNIA
SPRING LAMB SEASON (MARCH 15-JUNE 15), 1929†

Week ending	California, single-deck carloads	Colorado, double-deck carloads
March		
16	4	424
23	6	505
30	20	482
April		
6	52	612
13	126	529
20	216	539
27	547	405
May		
4	502	316
10	838	385
17	614	286
24	530	200
31	118	84
June		
7	30	
14	8	

* Data includes shipments from northern Colorado, Arkansas Valley (Colorado) and Scottsbluff (western Nebraska) sections.

† From January 1 to March 9, 1929, 3,355 double-deck carloads had been shipped from these areas.

Sources of data: All data are subject to revision. Computations by authors based upon Weekly Reviews of Livestock Market at San Francisco published by the U. S. Dept. Agr., Bur. Agr. Econ.

Feed Costs.—While the larger number of sheep raised in California are fed upon natural grasses, comparisons between the prices of feeds and sheep may prove to be of interest and value to the producer. Furthermore, the purchasing power of sheep and lambs in terms of feeds is of perhaps more interest than the purchasing power in terms of all commodities.

Since 1914 there has been a wide variation in the quantity of alfalfa hay required to purchase one hundred pounds of sheep or lambs (fig. 30). From 1914 until 1920, there was a marked decrease in the value of both sheep and lambs as compared with that of alfalfa hay. Since 1920 there has been a distinct improvement in the relationship with reference to lambs (fig. 30). Sheep do not show this improvement.

The relationship between lamb (or sheep) and barley prices during the period 1910–1920 did not give evidence of a definite trend. Since 1920 both sheep and lambs have been giving evidence of a greater relative value than barley (fig. 29). This has been true more especially with lambs. Prices paid for cottonseed meal are not available over a sufficiently long and continuous period to give definite information on the trend of the relationship between the prices of this feed and the price of lambs (or sheep). A part of the added interest in feeding can undoubtedly be found in the changed relationship since 1920 between the relative prices of lambs and feeds in this state.

INTERNATIONAL TRADE IN MUTTON AND LAMB

Foreign Trade of the United States.—Although the United States is practically self-sufficient with regard to mutton and lamb, potential supplies from the outside must be taken into consideration. Owing to the comparatively high prices for lamb prevailing in domestic markets, outside supplies may seek admission. During normal years imports and exports of live animals as well as lamb and mutton exports have been small, imports usually exceeding exports (table 59). In 1921 record-breaking shipments of frozen lamb entered the United States from Australasia and Argentina. The financial results of these shipments proved disappointing to the exporters and a large proportion of the carcasses were re-exported. The effect on local lamb prices was disastrous. The American people, as a whole, will not buy frozen carcasses.⁷³ Given proper refrigeration facilities and chilled carcasses, the results of future importations might be different.

⁷³ Clemen, Rudolf A. The American livestock and meat industry. 872 p. 36 figs. The Ronald Press Co., New York. 1923.

World Trade in Mutton and Lamb.—Although the amount of mutton and lamb entering international trade channels is comparatively large the number of important participating countries is small. Four countries of the southern hemisphere—New Zealand, Argentina, Australia, and Uruguay—dominate the world export trade, furnishing over 95 per cent of such exports. New Zealand alone contributes over one-half of the total shipments.

TABLE 59

GENERAL IMPORTS AND DOMESTIC EXPORTS OF (1) SHEEP AND (2) MUTTON AND LAMB, UNITED STATES, 1910–1928

Fiscal year	Sheep		Mutton and lamb	
	Imports	Exports	Imports	Exports
	<i>number of head</i>	<i>number of head</i>	<i>thousands of pounds</i>	<i>thousands of pounds</i>
1910	126,152	44,517	548	1,989
1911	53,455	121,491	500	2,160
1912	23,588	157,263		3,728
1913	15,428	187,132		5,266
1914	223,719	152,600	12,691	4,685
1915	153,317	47,213	15,529	3,877
1916	235,659	52,278	20,258	5,553
1917	160,422	58,752	4,684	3,196
1918	177,687	7,959	2,008	2,098
1919	163,283	16,117	4,542	2,174
1920	199,549	59,155	16,358	3,958
1921	161,292	80,723	108,528	7,255
1922	96,538	62,354	12,855	2,502
1923	82,903	15,791	8,709	1,769
1924	34,986	8,852	3,497	1,633
1925	45,806	19,410	766	1,460
1926	55,841	12,000	3,456	1,366
1927	42,844	13,000	2,852	984
1928	30,426	22,238	3,125	999
1929	33,396	3,841	4,406	915

Source of data: U. S. Dept. Com., Monthly Summaries of Foreign and Dom. Com.

On the import side Great Britain's demands account for over 90 per cent of the world's exports. Since the War imports into France have increased rapidly amounting in 1927 to almost 30 million pounds. Germany has also increased its demands but these are insignificant when compared with world totals. With the exception of the countries of western Europe there are no importing countries of consequence. The United States' interest in the international movement of mutton and lamb lies primarily in the extent to which the European markets for pork exports are affected by available mutton and lamb supplies.

WOOL PRODUCTION

The leading sheep producing countries are Australia, Russia, United States, Union of South Africa, Argentina, India, New Zealand and the United Kingdom. The densest areas of wool and mutton production are Australia, New Zealand, South Africa, and Argentina in the southern hemisphere, and the British Isles and the Mediterranean region in the northern (fig. 31).

World Wool Production.—Estimates of the world production of wool are shown in table 60. During the War, production declined slightly, recovering during 1919–1921. It dropped to a low point in 1922 on account of low yields in all sections of the world (Australasia excepted). Since the latter date there has been a rapid rise. Undoubtedly this increase has been brought about in part by favorable weather conditions and in part by comparatively high prices prevailing on

NUMBER OF SHEEP IN THE WORLD, 1928



Fig. 31.—The leading sheep-producing countries of the world are Australia, Russia, United States, Argentina, Union of South Africa, United Kingdom, and New Zealand. In Russia and the United States the distribution is less dense than in the other countries. The relatively new areas of Australia, Argentine-Uruguay, South Africa, and New Zealand, having sparse human populations, are in the southern hemisphere. The rough topography of the Mediterranean with its equable climate is conducive to a dense sheep population. In Great Britain the abundant pasture stimulates sheep production in spite of the dense human population. 1 dot = 500,000 sheep. (Data from the livestock census reports of the International Institute of Agriculture, Rome, Italy.)

TABLE 60
ESTIMATED PRODUCTION OF WOOL BY GRAND DIVISIONS, 1909-1928
(Millions of pounds, i.e., 000,000 omitted)

Year	Australasia		Europe		South America		North America		Asia		Africa		Total
	Pro- duction	Per cent of total	Pro- duction	Per cent of total	Pro- duction	Per cent of total	Pro- duction	Per cent of total	Pro- duction	Per cent of total	Pro- duction	Per cent of total	
1909	757	27	805	29	545	19	347	12	210	7	140	5	2,804
1910	834	28	813	28	586	20	341	12	218	7	162	5	2,953
1911	820	28	814	28	500	17	338	12	273	9	175	6	2,920
1912	833	28	813	27	555	19	322	11	273	9	175	6	2,971
1913	750	26	804	28	531	18	315	11	273	9	208	7	2,881
1914	827	29	800	28	455	16	309	11	273	10	208	7	2,872
1915	767	27	803	28	477	17	308	11	273	10	208	7	2,836
1916	645	24	804	30	480	18	307	11	273	10	208	8	2,717
1917	742	27	794	28	470	17	304	11	273	10	208	7	2,791
1918	742	26	798	28	318	11	470	17	273	10	208	7	2,809
1919	825	29	772	27	484	17	336	12	327	11	150	5	2,894
1920	852	29	751	25	487	16	328	11	327	11	220	7	2,965
1921	718	24	899	30	592	20	298	10	327	11	169	6	3,003
1922	818	30	663	25	399	15	281	10	265	10	278	10	2,704
1923	816	30	617	23	470	17	283	10	267	10	267	10	2,721
1924	770	28	657	24	465	17	301	11	289	11	247	9	2,720
1925	881	31	622	22	485	17	319	11	289	10	230	8	2,826
1926	976	32	674	22	510	17	334	11	258	9	271	9	3,022
1927	1,057	31	809	24	553	16	349	10	276	8	350	10	3,394
1928	1,043	30	771	22	565	16	372	11	348	10	368	11	3,467

Sources of data: Nat. Assoc. Wool Manfrs., Ann. Wool Revs.

TABLE 61
NUMBER OF SHEEP IN CERTAIN COUNTRIES
(Average 1909-1913, Annual 1925-1928)

Country	Number of head in thousands					Increase (+) or decrease (-) in 1927 (or 1926) compared with	
	Average 1909-1913*	1925	1926	1927	Preliminary 1928	1909-1913	1925
Canada.....	2,208	2,756	3,142	3,263	3,416	+ 1,055	+ 507
United States.....	51,929	38,112	39,730	41,881	44,554	-10,048	+ 3,769
Mexico.....	3,424	2,698					
North America reporting: Pre-war to 1928.....	54,137	40,868	42,872	45,144	47,970	- 8,993	+ 4,276
Peru.....				12,000†			
Bolivia.....	1,750	3,436	4,200				
Chile.....	3,477	4,094					
Brazil.....	10,550						
Uruguay.....	26,286†			22,500		- 3,786	
Argentina.....	43,225						
South American totals (estimated).....	93,240						
England and Wales.....	18,346	15,975	16,859	17,072	16,386	- 1,274	+ 1,097
Scotland.....	7,028	7,119	7,203	7,536	7,505	+ 508	+ 417
Ireland.....	3,787	3,297	3,533	3,721	3,888	- 66	+ 424
Norway.....	1,398	1,529	1,595	1,608		+ 210	+ 79
Sweden.....	1,205	1,200					
France.....	16,176	10,172	10,537	10,775	10,693	- 5,401	+ 603
Spain.....	15,778	18,460	20,067	20,529		+ 4,751	+ 2,069
Portugal.....	3,073	3,684		4,450†		+ 1,377	+ 766
Italy.....	11,615			12,500†		+ 885	
Germany.....	4,988	5,735	4,753	4,080	3,819	- 908	- 1,655
Hungary.....	2,406	1,891	1,804	1,611	1,566	- 795	- 280
Yugoslavia.....	10,496	7,907	7,933	7,736		- 2,760	- 171
Greece.....	5,884	6,623	6,636	6,951	6,442	+ 1,067	+ 328
Bulgaria.....	8,551	7,450		8,682		+ 131	+ 1,232
Rumania.....	11,128	13,612	12,950	13,582	12,941	+ 2,454	- 30
Poland.....	4,473			1,918		- 2,555	
Lithuania.....	1,152	1,455	1,573	1,365		+ 213	- 90
Latvia.....	996	1,182	1,153	1,128		+ 132	- 54
Finland.....	1,330	1,451	1,414	1,368		+ 38	- 83
All Europe reporting (excluding Russia): Pre-war to 1927.....	101,379	97,128	98,676	99,729		- 1,650	+ 2,601
Pre-war to 1928.....	69,743	64,424	64,275	65,328	63,240	- 4,415	+ 904
Morocco.....	3,175	9,278	9,250	7,712		+ 4,537	- 1,566
Algeria.....	8,757	6,171	6,786	5,083	5,614	- 3,674	- 1,088
Tunis.....	705	1,379	1,329	2,172	2,142	+ 1,467	+ 793
French West Africa.....			4,365	3,968			
French Sudan.....				2,400			
Nigeria.....		1,479	1,809	1,827			+ 348
Egypt.....	816	1,091	1,144	1,232		+ 416	+ 141
Anglo-Egyptian Sudan.....		1,639	2,000	2,010			+ 371
British Somaliland.....			2,000	2,000	2,000		
Eritrea.....	1,585			1,842		+ 257	
Kenya Colony.....	5,469	2,679	2,756	2,842		- 2,627	+ 163
British Southwest Africa.....	555	966	1,069	1,252		+ 697	+ 286
Union of South Africa.....	30,657	35,570	38,849	40,109	40,694	+ 9,452	+ 4,539
Basutoland.....	1,369	2,051	2,100	2,149		+ 780	+ 98
Tanganyika.....	3,596	4,333	4,462	4,779		+ 1,183	+ 446
All Africa reporting: Pre-war to 1927.....	56,869	65,226	69,802	69,466		+12,597	+ 4,240
Pre-war to 1928.....	40,419	43,460	47,313	47,696	48,797	+ 7,277	+ 4,236

TABLE 61—(Concluded)

Country	Number of head in thousands					Increase (+) or decrease (−) in 1927 (or 1926) compared with	
	Average 1909–1913*	1925	1926	1927	Preliminary 1928	1909–1913	1925
Arabia.....				3,500			
Turkey.....	19,713	11,469	12,872	13,512		− 6,201	+ 2,043
Iraq (Mesopotamia).....		4,892	5,055				+ 163
Persia.....		4,000					
Syria.....		1,290	1,400	1,334			+ 44
British India.....	23,164	23,226	23,201	23,237		+ 73	+ 11
India, Native States.....	8,038	13,682	11,848			+ 3,810	− 1,834
China.....	25,951						
Dutch East Indies.....				1,292			
All Asia reporting (excluding Russia):							
Pre-war to 1927.....	42,973	35,014	36,417	37,118		− 5,855	+ 2,104
Australia.....	89,008	93,155	103,563	104,267	99,216	+15,259	+11,112
New Zealand.....	23,996	24,548	24,905	25,649	27,134	+ 1,653	+ 1,101
Oceania reporting:							
Pre-war to 1928.....	113,004	117,703	128,468	129,916	126,350	+16,912	+12,213
Russia.....	111,051	106,800	113,600	121,739	124,500	+10,688	+14,939
All countries reporting:							
Pre-war to 1927.....	479,927	462,853	489,983	503,267		+23,340	+40,414
Pre-war to 1928.....	388,450	373,574	396,872	410,192	411,252	+21,742	+36,618

* Average for 5-year period if available, otherwise for any year or years within the period except as otherwise stated. In countries having changed boundaries the pre-war figures are estimates for one year only of numbers within present boundaries.

‡ Unofficial. † 1908.

Source of data: U. S. Dept. Agr. The world situation in sheep and wools. Foreign Crops and Markets. 18(6): 180. 1929.

TABLE 62

ESTIMATED NUMBER OF SHEEP IN THE WORLD, 1909–1913 AND 1921–1925
(Thousands, i.e., 000 omitted)

Division	Average number		Per cent increase or decrease
	1909–1913	1921–1925	
North and Central American Countries.....	58,470	42,160	−27.9
South America.....	93,240	80,370	−13.8
Europe (excluding Russia).....	134,370	123,733	− 7.9
Africa.....	72,510	75,570	+ 4.2
Asia (excluding Russia).....	99,729	94,288	− 5.5
Oceania.....	113,010	108,939	− 3.6
Russia.....	111,051	92,501	−16.7
The World.....	682,000	618,000	− 9.4

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. The world situation in mutton and lamb. Foreign Crops and Markets 18(6): 180. 1929.

world markets. World production has not been accelerated to such an extent that prices have been greatly depressed, as has been the case with many agricultural commodities. Data on wool production in ten countries (United States, Canada, United Kingdom, France, Germany, Argentina, Uruguay, Australia, and New Zealand) which ordinarily produce a little over two-thirds of the world output, is estimated at 2,530,000,000 pounds in the grease for 1928, according to preliminary figures. This estimate is an increase of 6 per cent over 1927 and 5 per cent over 1926, the previous high year.

TABLE 63
PRODUCTION OF WOOL, UNITED STATES, 1849-1924
(Thousands of pounds, i.e., 000 omitted)

Division and state	1849	1859	1869	1879	1889	1899	1909	1919	1924
United States.....	52,517	60,265	100,102	155,682	191,278	276,568	289,420	228,795	227,105
North Atlantic states.....	22,014	21,134	24,141	24,722	18,447	17,110	10,527	8,253	6,356
North central states.....	19,255	22,903	51,561	72,073	60,966	73,909	73,381	63,850	52,133
South Atlantic states.....	5,868	5,368	4,805	8,109	6,555	7,892	6,677	5,268	4,606
South central states.....	5,303	7,370	5,900	15,900	25,391	17,688	17,483	21,340	25,421
Western states.....	77	3,490	13,695	34,879	79,919	159,968	181,353	130,083	138,591
Montana.....				995	12,177	30,438	37,669	18,267	16,714
Idaho.....			3	127	2,119	15,474	16,377	17,861	14,026
Wyoming.....			30	692	4,147	27,758	42,828	18,412	18,728
Colorado.....			205	3,197	4,544	8,544	7,563	9,755	6,474
New Mexico.....	33	493	685	4,019	7,981	15,209	16,994	8,301	9,776
Arizona.....				314	2,182	3,353	5,504	3,131	5,907
Utah.....	9	75	109	973	9,686	17,051	12,102	11,690	18,796
Nevada.....			27	655	1,451	4,843	6,274	6,402	8,098
Washington.....		20	163	1,389	1,557	5,268	3,135	5,009	4,243
Oregon.....	30	219	1,081	5,719	9,983	18,350	18,842	16,039	14,750
California.....	6	2,683	11,392	16,798	24,093	13,680	14,065	15,217	21,079

Sources of data: 1849-1919. Dept. Commerce, Bur. Census. Production of wool. Fourteenth Census, U. S. 5: 676. 1922. 1924. Dept. Commerce, Bur. Census. Livestock on farms and livestock products. U. S. census of agriculture: Summary statistics by states, 1925: 28-37. 1927.

During the past twenty years significant shifts have taken place in producing areas (table 60). Australasia has emerged as the most important wool-producing area of the globe, displacing Europe. Increased settlement in South America and competition with other industries has reduced both actual and relative production. A slight tendency for a decrease in the relative production of North America is discernible in the data in table 60. Asiatic production was apparently stimulated by the War. While it is difficult to obtain accurate data for all of Asia, estimates point to a net increase when post-war are compared with pre-war years. Africa has shown the largest relative increase of any of the grand divisions.

TABLE 64

PERCENTAGE DISTRIBUTION OF WOOL PRODUCTION, UNITED STATES, 1849-1924

Division and state	1849	1859	1869	1879	1889	1899	1909	1919	1924
North Atlantic states.....	41.92	35.07	24.12	15.88	9.64	6.19	3.63	3.61	2.80
North central states.....	36.66	38.00	51.51	46.30	31.87	26.72	25.36	27.91	22.96
South Atlantic states.....	11.17	8.91	4.80	5.21	3.43	2.85	2.31	2.30	2.03
South central states.....	10.10	12.23	5.89	10.21	13.28	6.39	6.04	9.33	11.20
Western states.....	0.15	5.80	13.68	22.41	41.78	57.84	62.66	56.86	61.03
Montana.....				0.64	6.37	11.01	13.02	7.98	7.36
Idaho.....				0.08	1.11	5.60	5.66	7.81	6.18
Wyoming.....			0.03	0.44	2.17	10.04	14.80	8.05	8.25
Colorado.....			0.20	2.05	2.38	3.09	2.61	4.26	2.85
New Mexico.....	0.06	0.82	0.68	2.58	4.17	5.50	5.87	3.63	4.30
Arizona.....				0.20	1.14	1.21	1.90	1.37	2.60
Utah.....	0.02	0.12	0.11	0.63	5.06	6.17	4.18	5.11	8.28
Nevada.....			0.03	0.42	0.76	1.75	2.17	2.80	3.57
Washington.....		0.03	0.16	0.89	0.81	1.90	1.08	2.19	1.87
Oregon.....	0.06	0.36	1.08	3.67	5.22	6.63	6.51	7.01	6.49
California.....	0.01	4.45	11.38	10.79	12.60	4.95	4.86	6.65	9.28

Source of data: Calculations by author based upon table 63.

RELATIVE IMPORTANCE OF MAIN WOOL-PRODUCING STATES, 1927-1928

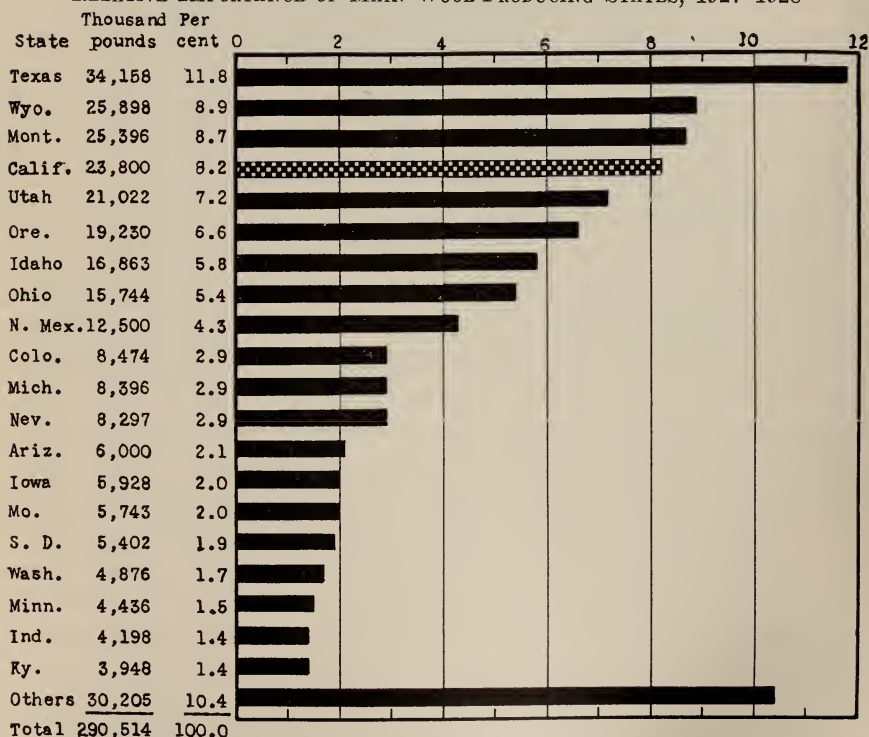


Fig. 32.—Ninety per cent of the wool shorn in the United States is produced in 20 states. The 11 western states together with Texas, account for approximately 71 per cent. California ranks fourth among the states, occupying a place of lesser importance for wool than for lamb production. (See fig. 22.) (Data from table 67.)

Production in the United States.—Wool is now predominately a by-product of the meat industry in the United States. Formerly, wool production was the mainspring of the sheep industry but with the diminishing sheep population and the growing popularity of lamb, conditions are tending more and more to a meat production basis, with wool as the by-product. The United States is one of the leading wool-producing countries of the world. In spite of this fact this country normally imports more wool than is produced.

The quantity of wool produced annually in the United States has remained practically stationary for the past forty years. The domestic product amounted to about 300,000,000 pounds (fleece wool) in 1883,

TABLE 65
WOOL PRODUCTION IN THE UNITED STATES,* 1915-1928
(Thousands of pounds, i.e., 000 omitted)

Year	Washed and in the grease	Scoured	Year	Washed and in the grease	Scoured
1915	288,777	131,988	1922	261,095	119,229
1916	288,490	130,756	1923	266,110	121,652
1917	285,573	129,431	1924	282,330	128,117
1918	299,921	130,611	1925	301,112	135,035
1919	314,239	138,937	1926	310,500	140,898
1920	302,207	137,315	1927	332,014	149,369
1921	273,064	126,021	1928	351,013	156,970

* Includes fleece and pulled wool.

Sources of data: Nat. Assoc. of Wool Manfrs. Estimated wool product of the United States. Ann. Wool Rev. 1928: 141. 1929.

and until very recently it has scarcely varied from this figure by as much as 20,000,000 pounds (table 66). The smallest annual product was in 1897, when the total clip amounted to only 259,000,000 pounds, and the largest in 1893, when 348,000,000 pounds (fleece wool) were secured from domestic sources. There naturally is a close correlation between the number of sheep and the wool production. Since 1922, when both sheep and wool production were at low points, wool production has been climbing, and in 1928 it was higher than at any time since estimates have been made of both fleece and pulled wool (table 67; table 63 is taken from the census). If cycles in numbers of sheep continue there is every reason to believe that those in wool production will also continue. Wool is primarily a western product. (fig. 32).

Since 1886, there has been a slight increase⁷⁴ in the production of wool in the United States (4.36 per cent increase from 1886 to 1928).

⁷⁴ The equation of the line of trend of wool production in the United States 1886-1928 is $y = 294,450,000 + 299,310x$ with center at July 1, 1907.

The per-capita production during this period has been downward. Since 1870⁷⁵ the per-capita production of wool in the United States has fallen from 4.94 pounds to 2.63 pounds (trend values) or a decrease of over 46 per cent.

AVERAGE WEIGHT OF FLEECE, UNITED STATES, 1928

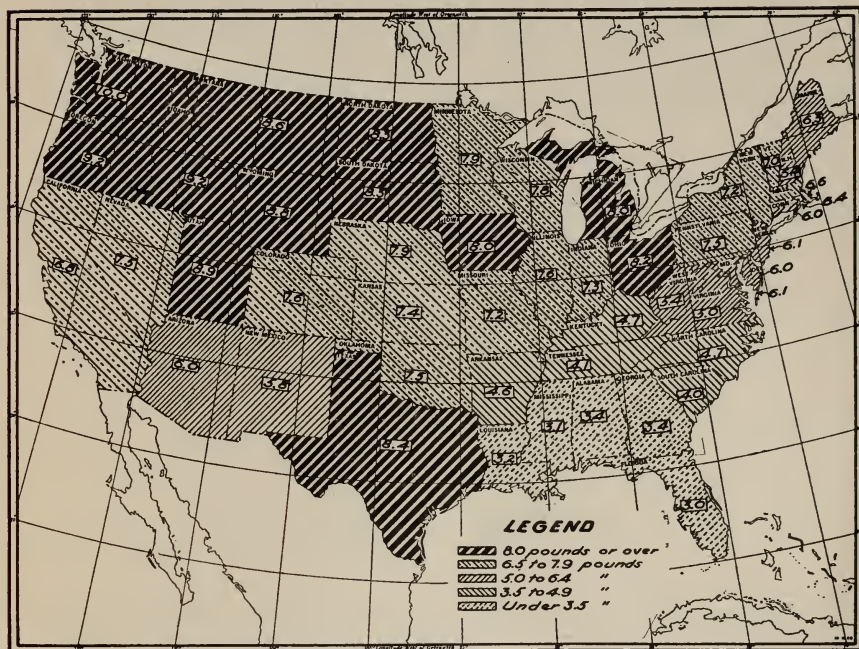


Fig. 33.—In 1928, the estimated average weight of fleece in the United States was 7.8 pounds. California was slightly below this average. Fleece weights are low in the southeastern section of the country. Except in the northern portion of this area, sheep raising is relatively unimportant. (Data from U. S. Dept. Agr. Wool Shorn. Crops and Markets 62:56. 1929.)

The data in table 65 are for wool which is washed and in the grease. The National Association of Wool Manufacturers issues reports on wool production which differ slightly from those of the United States Department of Agriculture.

California Production.—Estimates have been made of the yearly wool production of California since 1854.⁷⁶ In this series the early data are questioned as they do not check with the census data, yearly

⁷⁵ The equation of the line of trend of per-capita wool production in the United States 1870–1928 is $y = 3.7863 - .0398x$ with center at July 1, 1899. If 1886 had been taken as the beginning of the period instead of 1870, the decline in per-capita production would have been larger.

⁷⁶ California State Board of Agriculture. California wool production. Report of the State Statistician, 1913:67. 1914.

fluctuations appearing unduly large. There can be but little doubt that the wool production of the state during the 1870s and 1880s was higher than at the present time. Between 1890 and 1900, both census data and commercial estimates indicate that wool production decreased by almost one-half.

Judging both from the number of sheep in California and the estimated production of wool, there were only slight fluctuations in wool production between 1900 and 1919 (table 69). During the war years the number of sheep in the state increased although the resultant

TABLE 66

WOOL PRODUCTION IN THE UNITED STATES BY FIVE-YEAR AVERAGES, 1885-1924,
AND FOUR-YEAR AVERAGE, 1925-1928

Years	Thousands of pounds
1885-1889	310,491
1890-1894	324,669
1895-1899	272,967
1900-1904	297,343
1905-1909	306,349
1910-1914	306,064
1915-1919	295,400
1920-1924	276,398
1925-1928	321,741

Sources of data: 1885-1919, U. S. Tariff Comm. Tariff Inform. Ser. The wool growing industry. 592 pp. 1921. 1920-1926, U. S. Dept. Agr. Wool, raw: production 1910-1926. Yearbook 1926: 1131. 1927. 1927, 1928, information to authors from O. C. Stine, Bur. Agr. Econ., Washington, D. C., March 22, 1929.

increased wool clip did not become evident until 1919. This increased clip had scarcely made its appearance when the market broke. After a slight recession, the wool clip again took an upward trend. Since 1922 there has been a rapid acceleration in production, and California has been contributing a gradually increasing proportion of the nation's production (tables 63, 64, 67, and 68). During the past six years, production in this state has climbed rapidly. Table 70 shows that the average fleece weight in California is less than the average for most of the rest of the country (fig. 33). In this state where many growers shear twice a year the figures for average weight per fleece covers wool per head of sheep shorn and not weight per fleece. By proper breeding and selection, it would be possible to increase the average weight of fleece at least a pound without deleteriously affecting the number or quality of milk lambs.⁷⁷

⁷⁷ Letter from Prof. James F. Wilson to Edwin C. Voorhies, Feb. 25, 1929.

TABLE 67

ESTIMATED PRODUCTION OF FLEECE WOOL, UNITED STATES, 1919-1928

(Thousands of pounds, i.e., 000, omitted)

State and division	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
North Atlantic states.....	8,357	8,477	7,705	7,228	7,288	7,220	7,464	6,981	6,777	7,002
North central states.....	61,637	60,586	52,956	52,280	52,925	54,470	58,912	58,215	63,645	66,208
South Atlantic states.....	5,499	5,518	5,096	5,233	5,566	5,450	5,332	5,057	5,375	5,797
South central states.....	21,936	24,900	23,924	25,086	25,591	28,225	30,975	33,049	39,165	42,332
Western states.....	152,519	135,524	133,381	132,733	132,240	143,165	151,224	157,674	166,952	177,774
Montana.....	18,267	16,000	16,400	16,770	17,775	19,314	20,871	23,320	24,166	26,626
Idaho.....	22,145	18,650	16,800	16,642	15,455	16,800	17,347	14,507	15,840	17,885
Wyoming.....	26,000	21,000	21,200	20,400	18,800	19,760	22,360	22,338	25,317	26,488
Colorado.....	7,332	6,888	6,839	6,976	6,580	6,580	7,312	7,740	8,118	8,831
New Mexico.....	11,600	10,600	10,100	11,246	10,890	12,408	12,113	12,060	12,600	12,400
Arizona.....	5,400	4,800	5,616	6,000	5,798	6,240	6,400	6,758	6,240	5,760
Utah.....	17,000	16,150	16,500	16,800	17,210	16,884	18,040	19,430	19,975	22,072
Nevada.....	7,750	7,500	7,000	7,650	7,942	8,000	7,811	8,730	8,015	8,580
Washington.....	5,779	5,201	4,421	3,802	4,409	4,635	4,400	4,194	4,753	5,000
Oregon.....	16,039	14,435	14,435	12,992	13,200	15,688	16,720	18,321	18,128	20,332
California.....	15,217	14,300	14,070	13,455	14,181	16,856	17,850	20,276	23,800	23,800
United States.....	249,958	235,005	223,062	222,560	223,610	238,530	253,907	260,976	281,914	299,113

Sources of data: 1919-1923. U. S. Dept. Agr. Estimated production of wool. Crops and Markets 1: 62. 1924. 1924-1926. August issues of U. S. Dept. Agr. Crops and Markets. 1927-1928. U. S. Dept. Agr. Wool shorn 1927 and 1928. Crops and Markets 6 (2): 56. 1929.

TABLE 68

PERCENTAGE DISTRIBUTION OF WOOL PRODUCTION, UNITED STATES, 1919-1928

State and division	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
North Atlantic states.....	3.34	3.61	3.45	3.25	3.26	3.03	2.94	2.68	2.40	2.34
North central states.....	24.66	25.78	23.74	23.49	23.67	22.84	23.20	22.31	22.58	22.13
South Atlantic states.....	2.20	2.35	2.28	2.35	2.49	2.28	2.10	1.94	1.91	1.94
South central states.....	8.78	10.60	10.73	11.27	11.44	11.83	12.20	12.66	13.89	14.15
Western states.....	61.02	57.67	59.80	59.64	59.14	60.02	59.56	60.42	59.22	59.43
Montana.....	7.31	6.81	7.35	7.54	7.95	8.10	8.22	8.94	8.57	8.90
Idaho.....	8.86	7.94	7.53	7.48	6.91	7.04	6.83	5.56	5.62	5.98
Wyoming.....	10.40	8.94	9.50	9.17	8.41	8.28	8.81	8.56	8.98	8.86
Colorado.....	2.93	2.93	3.07	3.13	2.94	2.76	2.88	2.97	2.88	2.95
New Mexico.....	4.64	4.51	4.53	5.05	4.87	5.20	4.77	4.62	4.47	4.15
Arizona.....	2.16	2.04	2.52	2.70	2.59	2.62	2.52	2.59	2.21	1.93
Utah.....	6.80	6.87	7.40	7.55	7.70	7.08	7.10	7.45	7.09	7.38
Nevada.....	3.10	3.19	3.14	3.44	3.55	3.35	3.08	3.35	2.84	2.87
Washington.....	2.31	2.21	1.98	1.71	1.97	1.94	1.73	1.61	1.69	1.67
Oregon.....	6.42	6.14	6.47	5.84	5.90	6.58	6.59	7.02	6.43	6.80
California.....	6.09	6.08	6.31	6.05	6.34	7.07	7.03	7.77	8.44	7.96

Source of data: Computation by author based upon table 67.

TABLE 69

ESTIMATES OF WOOL PRODUCTION, CALIFORNIA, 1900-1929

(Thousands of pounds, i.e., 000 omitted)

Year	Production	Year	Production	Year	Production
1900	13,352	1910	13,300	1920	14,300
1901	12,319	1911	11,900	1921	14,070
1902	12,506	1912	11,900	1922	13,455
1903	11,781	1913	11,200	1923	14,181
1904	11,781	1914	11,480	1924	16,856
1905	12,688	1915	11,590	1925	17,850
1906	13,125	1916	11,600	1926	20,276
1907	12,688	1917	12,180	1927	23,800
1908	13,300	1918	12,545	1928	23,800
1909	13,300	1919	15,217	1929	25,192

Sources of data: 1900-1918. Estimates made yearly in quarterly bulletins of the Nat. Assoc. of Wool Manfrs. 1919-1928. Estimates of the U. S. Dept. Agr., Bur. Agr. Econ. Estimates are published in monthly issues of U. S. Dept. Agr. Crops and Markets. 1929. The world wool situation. U. S. Dept. Agr. Bur. Agr. Econ. mimeographed report issued Aug. 22, 1929.

TABLE 70

AVERAGE WEIGHT OF FLEECE, UNITED STATES AND CALIFORNIA; SHRINKAGE,
UNITED STATES, 1901-1929

Year	Weight of fleece		Shrinkage United States	Year	Weight of fleece		Shrinkage United States
	United States	Calif- ornia			United States	Calif- ornia	
	<i>pounds</i>	<i>pounds</i>	<i>per cent</i>		<i>pounds</i>	<i>pounds</i>	<i>per cent</i>
1901	6.33	7.00	60.6	1915	6.80	6.10	58.5
1902	6.50	7.25	60.0	1916	6.86	6.30	59.1
1903	6.25	7.25	60.8	1917	6.95	7.00	59.2
1904	6.50	7.25	61.6	1918	7.11	7.00	60.8
1905	6.56	7.25	61.3	1919	7.39	7.40	60.4
1906	6.66	7.50	61.8	1920	7.22	7.60	58.7
1907	6.60	7.25	60.6	1921	7.10	7.50	59.0
1908	6.70	7.00	60.5	1922	7.10	7.30	59.0
1909	6.80	7.00	60.9	1923	7.30	7.40	59.0
1910	6.70	7.00	60.0	1924	7.40	7.30	59.0
1911	6.98	7.00	60.4	1925	7.60	7.50	60.0
1912	6.82	7.00	59.3	1926	7.80	7.40	60.0
1913	6.95	7.00	60.0	1927	7.74	7.00	59.0
1914	6.76	6.20	59.2	1928	7.80	6.80	.....
				1929	7.60	6.70	.....

Sources of data: 1901-1919, Natl. Assoc. Wool Manfrs. Weight and shrinkage. Bul. of Natl. Assoc. Wool Manfrs. 50: 50. 1920. 1920-1927, United States; Natl. Assoc. Wool Manfrs. Weight and shrinkage. Ann. Wool Rev. 1927: 140. 1928. 1920-1927, California; U. S. Dept. Agr. Wool shorn. Yearbook 1927: 1133. 1928. 1928, U. S. Dept. Agr. Wool shorn. Crops and Markets 6 (2): 56. 1929. 1929. The world situation. U. S. Dept. Agr. Bur. Agr. Econ. mimeographed report issued Aug. 22, 1929.

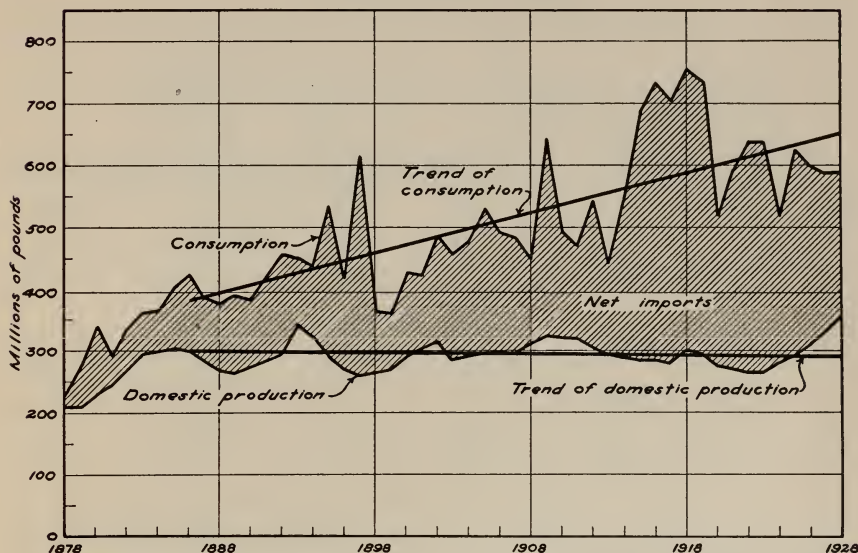
DOMESTIC PRODUCTION, NET IMPORTS, AND CONSUMPTION OF WOOL,
UNITED STATES, 1878-1928

Fig. 34.—The production of wool in the United States has shown little or no trend since 1886. There is, however, a somewhat indefinite cyclical movement in production which since 1923 has been in the upward phase. The total consumption of wool has been increasing, forcing the country to depend more and more on imports. The shaded area represents the net imports. (Data from U. S. Dept. Agr. Yearbook 1923:1001-1002. 1924; *ibid.*, 1927:1036. 1928; and from U. S. Dept. Agr. Bur. Agr. Econ., Washington, D.C.)

CONSUMPTION OF WOOL

United States.—Figure 34 and table 71 give some indication of the consumption of wool in the United States. During the period 1886-1928 the total consumption increased by 67.5 per cent.⁷⁸ (trend value), whereas production has shown no pronounced trend in either direction (fig. 34). The increase in consumption has been irregular.

Figure 35 illustrates the situation in the per-capita production and consumption of wool in the United States. Since 1870 the per-capita consumption has decreased from 6.22 to 5.70 pounds (trend values) or 8.3 per cent.⁷⁹

⁷⁸ The equation of the line of trend of wool consumption in the United States 1886-1928 is $y = 516,700,000 + 6,210,000 x$, origin July 1, 1906.

⁷⁹ The equation of the line of trend of per-capita wool consumption in the United States, 1870-1926 is $y = 5.960 - 0.009 x$, origin July 1, 1898.

PER CAPITA CONSUMPTION AND PRODUCTION OF WOOL, UNITED STATES, 1877-1928

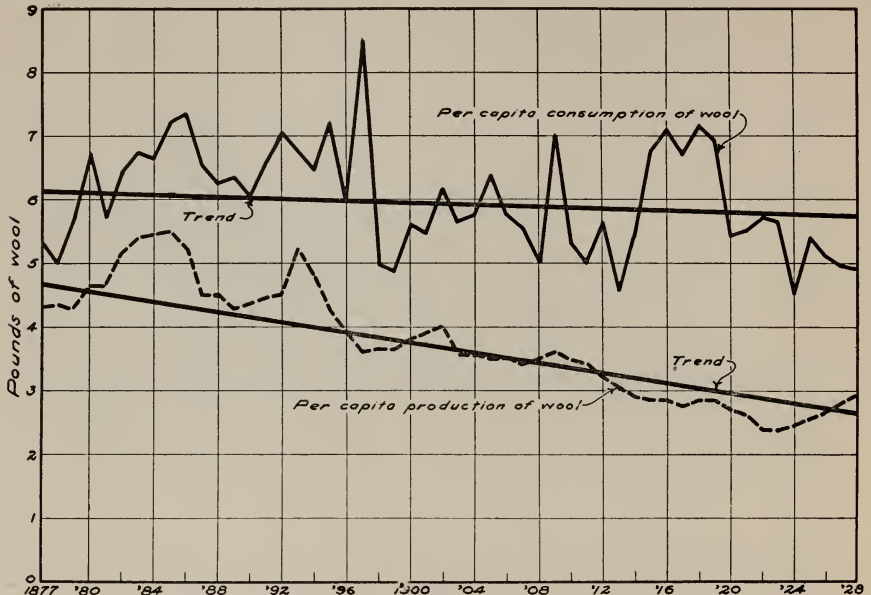


Fig. 35.—The per capita consumption of wool gives evidence of violent yearly fluctuations. It has been less subject to fluctuations since 1900 than previously. The per-capita production of wool in the United States has been decreasing far more rapidly than the per capita consumption, as indicated by this chart. (Data computed by authors from U. S. Dept. Agr. Yearbook 1923:1001-1002. 1924; *ibid.*, 1927:1036. 1928; and estimated population of the United States.)

Since 1910 there has been a pronounced decline. The surprising growth of the rayon industry, the increased use of silk, and the changes in women's styles have undoubtedly exerted an influence on this downward movement. Other contributing causes have been the increasing consumption of furs, the increasing use of closed automobiles and the prevalence of well-heated buildings. On the other hand, the heavy demand for wool in automobile manufacture has served to operate in the opposite direction. Undoubtedly some waste has been eliminated, which might account for a portion of the slight loss in per-capita consumption. It would be hazardous to attempt to predict the direction which consumption will take. Unless revolutionary changes occur, in all probability it will not be greatly affected within the next few years. By comparing the lines of trend in figure 35 it is evident that the average individual in the United States has steadily become more dependent upon outside supplies of wool. It should be noted that the larger part of these wools are low grade.

TABLE 71

WOOL SUPPLY OF THE UNITED STATES, 1888-1928. DOMESTIC PRODUCTION* AND IMPORTS LESS EXPORTS
(Thousands of pounds, i.e., 000, omitted)

Fiscal years ended June 30	Annual average	All wools	Fine wools†	Percentage fine wools
1888-1892	5 years	424,482	337,364	79.48
1893-1897	5 years	509,984	414,085	81.20
1888-1897	10 years	467,233	375,724	80.41
1898-1902	5 years	397,755	316,475	79.57
1893-1902	10 years	453,869	365,280	80.48
1903-1907	5 years	495,397	385,124	77.74
1898-1907	10 years	446,576	350,799	78.55
1908-1912	5 years	508,338	412,182	81.08
1903-1912	10 years	501,867	398,653	79.43
1913-1917	5 years	621,461	530,903	85.43
1908-1917	10 years	564,899	471,543	83.47
1918-1922	5 years	647,811	565,173	87.24
1913-1922	10 years	634,636	548,038	86.35
1923-1927	5 years	610,174	475,841	77.98
1918-1927	10 years	628,993	520,507	82.75
1928	1 year	580,471	435,298	74.99

* Does not include estimated production of mohair until 1923.

† Includes all except carpet wools.

Sources of data: Natl. Assoc. Wool Manfrs. Wool supply, 1888-1928. Ann. Wool Rev. 1928: 145. 1929.

TABLE 72

STOCKS OF WOOL HELD BY MANUFACTURERS AND DEALERS, UNITED STATES,
1917-1929
(Grease equivalents in thousands of pounds, i.e., 000 omitted)

Year	March 31	June 30	Sept. 30	Dec. 31
1917	.....	584,731	643,518	562,546
1918	427,286	494,174	462,935	272,062
1919†	543,469	674,430	729,374	603,377
1920†	549,009	531,925	518,452	570,678
1921†	622,234	576,523	590,113	*
1922	.....	479,151	525,174	515,543
1923	501,341	531,698	474,748	415,681
1924	371,158	410,381	391,248	359,612
1925	305,957	382,596	373,010	346,678
1926	331,323	397,445	375,713	324,578
1927	291,657	385,615	357,107	303,688
1928	261,749	385,407	369,816	309,566
1929	280,260	.....	.....	.....

* No report issued.

† Stock held by the government are included in totals.

Source of data: U. S. Dept. Com. Wool Stock Reports, issued quarterly.

Approximately 90 per cent of the mill consumption of wool in the United States is absorbed in the middle Atlantic and New England states. The woolen-goods industry centers largely around Boston and Philadelphia. The former city is the chief wool market in the United

States, often handling 75 per cent of the domestic wool and occasionally 70 per cent of the imported wool. Centers of production and consumption in the United States are far apart.

Stocks of Wool Held by Manufacturers and Dealers, United States.—The United States Department of Commerce issues a quarterly report on the stocks of wool held by dealers and manufacturers (table 72). This is indicative of the demand for wool as well as of the supply on hand. It is noticeable that stocks during 1927 and 1928 have been relatively low.

PRICES AND PURCHASING POWER OF WOOL

Owing to variations in the quality and grade of wool it is difficult if not impossible to offer any one series of price or value data which will accurately depict price or value trends. There are unique conditions of supply and demand controlling each price, but there is nevertheless a general correspondence between all prices.

Trends in Prices.—On account of the individual deviations and fluctuations several price series are used. The Division of Statistical and Historical Research of the Bureau of Agricultural Economics has furnished a series of wool prices (Ohio washed clothing fleece) covering almost a century (fig. 36). Being a world commodity, the price level of wool is determined to some extent by world conditions of supply and demand (fig. 37). Substitutes play an important rôle, the price of wool being more affected by the price of cotton than by that of any other fiber (fig. 38). In the United States the natural play of economic forces has been interfered with by artificial influences. With every tariff change the import duties on wool have been revised.

TABLE 73
PERCENTAGE MONEY RETURNS FROM MEAT AND BY-PRODUCTS OF VARIOUS
FARM ANIMALS

Animal	Percentage returns from		
	Meat	By-products	Hide or pelt
Sheep.....	81.4	4.1	14.5
Steer.....	87.3	4.1	8.6
Calf.....	92.8	7.2	Sold with carcass
Hog.....	96.6	3.4	Sold with carcass

Source of data: Clemen, Rudolf A. *By-products in the packing industry*. 410 p., 50 fig. Univ. of Chicago Press, Chicago, 1927.

TABLE 74

ACTUAL AND RELATIVE PRICES OF CERTAIN WOOLS ON THE BOSTON MARKET
1890-1928

Year	Price of wool, cents per pound			Relative price, 1926=100			Relative purchasing power, 1926=100		
	I*	II*	III*	I	II	III	I	II	III
1890.....	59			60			107		
1891.....	60			61			110		
1892.....	56			57			109		
1893.....	46			47			88		
1894.....	34			35			72		
1895.....	33			34			69		
1896.....	31			32			68		
1897.....	39			40			85		
1898.....	46	48		47	42		97	86	
1899.....	46	51	24	47	44	50	90	85	96
1900.....	52	56	26	53	49	54	95	87	97
1901.....	43	47	22	44	41	46	79	74	83
1902.....	45	51	22	46	44	46	78	75	78
1903.....	48	55	25	49	48	52	82	80	87
1904.....	54	59	28	55	51	58	92	86	98
1905.....	68	72	34	69	63	71	116	104	118
1906.....	68	71	33	69	62	69	112	100	111
1907.....	66	70	33	67	61	69	103	93	105
1908.....	50	60	27	51	52	56	81	83	89
1909.....	64	70	34	65	61	71	97	90	105
1910.....	60	65	31	61	57	65	87	80	92
1911.....	50	57	26	51	50	54	79	76	84
1912.....	56	64	29	57	56	60	83	81	87
1913.....	52	56	26	53	49	54	76	70	78
1914.....	55	59	26	56	51	54	82	75	80
1915.....	66	71	36	67	62	75	97	89	108
1916.....	77	84	42	79	73	88	92	85	102
1917.....	136	157	67	139	137	140	118	116	119
1918.....		182	77		158	160		121	122
1919.....	146	178	67	149	155	140	108	112	101
1920.....	136	160	53	139	139	110	90	90	72
1921.....	64	85	28	65	74	58	67	76	60
1922.....	105	125	46	107	109	96	111	112	99
1923.....	122	141	56	125	123	117	124	122	116
1924.....	122	142	57	125	124	119	127	126	121
1925.....	121	140	58	124	122	121	119	118	117
1926.....	98	115	48	100	100	100	100	100	100
1927.....	92	110	46	94	96	96	98	100	100
1928.....	101	116	55	103	101	115	106	103	117

* I Territory, fine and fine medium scoured. II Territory, fine staple scoured. III Ohio, Pennsylvania, and West Virginia, $\frac{3}{8}$ -blood combing, unwashed.

Sources of data: Cols. 1, 2, 3, Division of Statistical and Historical Research, Bur. Agr. Econ., U. S. Dept. Agr. Cols. 4, 5, 6, 7, 8, 9, computations by authors.

In general, wool prices have followed the general price level (fig. 39). Since 1836 trends have been fairly definite. From 1836 to 1843 there was a period of decline followed by an upward swing which culminated in 1864. From the latter date until 1896 prices gradually fell, after which they rose again until the outbreak of the World War.

PRICES AND PURCHASING POWER OF FINE AND COARSE OHIO WASHED CLOTHING WOOLS AT BOSTON, 1824-1922

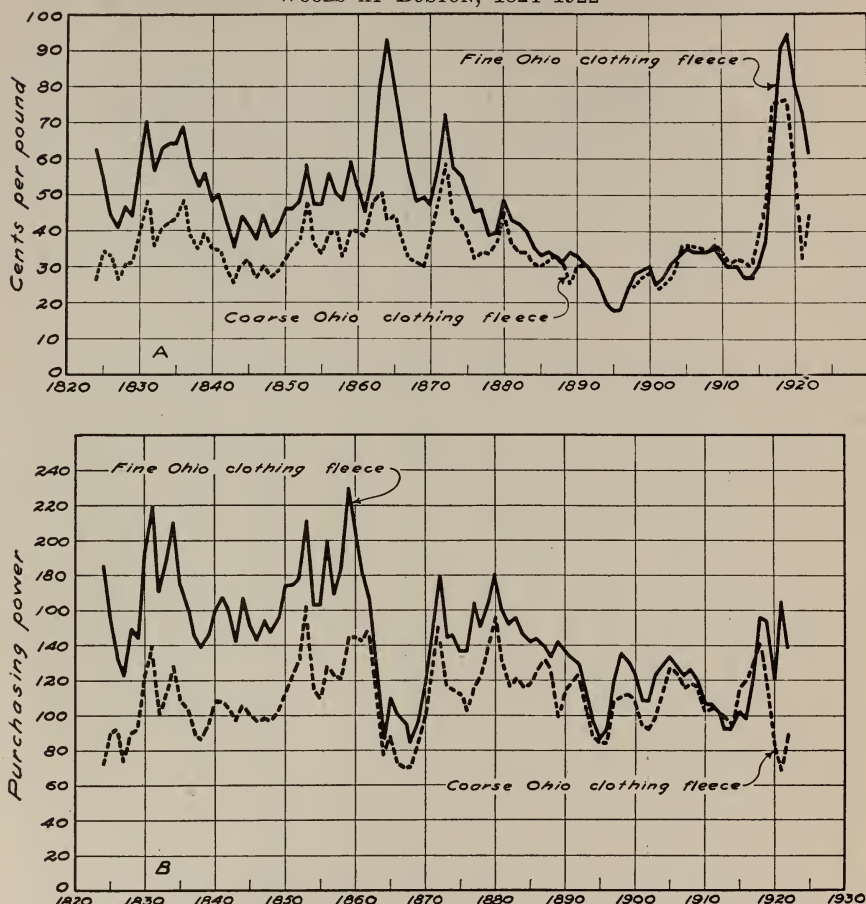


Fig. 36.—A, Prices of wool are available for over a century in the United States. The effect of both the Civil and World wars on prices are clearly shown. The long-time movements in wool prices can also be seen from the above figure. A fairly close correlation exists between wool prices and the prices of all commodities (fig. 39).

B, The base used—1910-1914—for the calculation of purchasing power was a period of comparatively low wool prices, consequently the purchasing power in terms of 1910-1914 dollars is high. (Original data from the U. S. Dept. Agr. Division of Statistical and Historical Research, Bur. Agr. Econ. Calculations on purchasing power made by authors.)

During the war, wool prices rose more rapidly than those of other commodities, which is evidenced when either the period 1910-1914 or the single year 1926 is taken as a base.

Too much dependence should not be placed on the term 'purchasing power' (table 74). It will be seen from figure 36 that the period 1910-1914 was a time of relatively low wool prices. Consequently, relative purchasing powers for wool on this base will appear high.

The upward movement in price was especially marked during 1917 when the United States entered the war. There was a prevalent belief that the great quantities of wool required for military use would cause a serious shortage of this staple. However, several factors were overlooked. Civilian demand for the use of wool was curtailed and in many instances garments were worn for a longer period of time than had previously been the custom. Markets for wool in the central European countries were suddenly shut off, and shipping was curtailed. These together with other factors caused a large surplus instead of a deficiency of wool in the southern hemisphere. At the close of the war the movement of this commodity from the southern hemisphere to the United States and Europe was accelerated. Europe was unprepared to take the supplies offered and in the spring of 1920

WOOL PRICES, LONDON AND BOSTON, 1921-1928

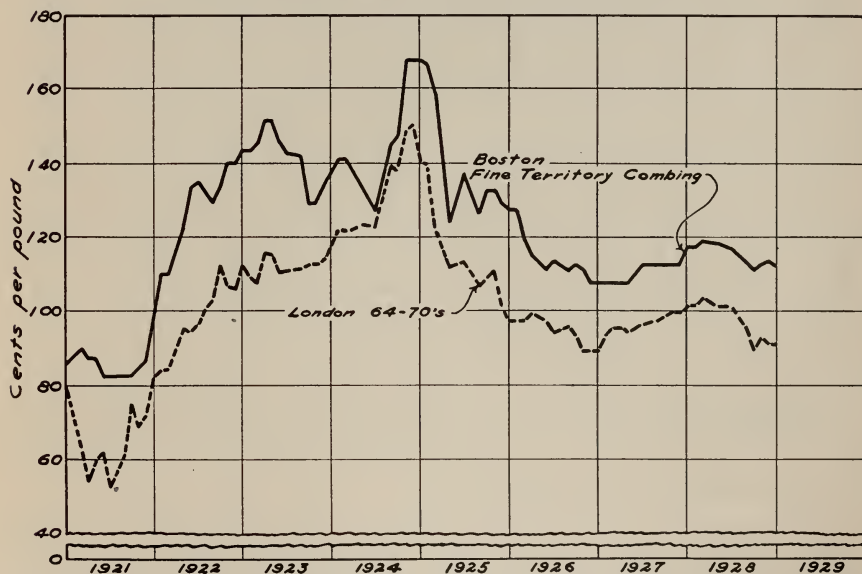


Fig. 37.—There is a close correlation between London and Boston prices for similar grades of wool. In the above diagram 'Fine Territory Combing' prices at Boston are compared with prices of '64-70's' at London. (Data from U. S. Dept. Agr. Bur. Agr. Econ. Div of Statis. and Hist. Research.)

the market broke, prices in the United States falling below the pre-war level. The liquidation continued through 1921. During 1922 a rapid recovery took place, since which time wool has occupied a favorable position among agricultural products. Until 1929 wool prices for ten years were relatively higher than the prices of cotton, silk and rayon.

Prices both at home and abroad began to weaken during the fall of 1928. During the first seven months of 1929 prices on most grades were lower than during the corresponding period of 1928. The world total wool output for 1928-29 was approximately 6 per cent larger than that of 1927-28. Indications point to a 1929-30 crop of approximately the same size as that of 1928-29.

TABLE 75

MONTHLY FARM PRICES OF WOOL (UNWASHED), UNITED STATES, 1910-1929
(Cents per pound)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Weighted* average
1910	24.5	24.6	24.9	22.3	22.8	19.5	19.0	19.5	17.7	18.1	17.9	17.8	20.5
1911	17.3	17.3	16.8	15.7	14.7	15.5	15.4	16.0	15.6	15.5	15.6	15.5	15.6
1912	16.2	16.3	16.9	17.3	17.8	18.7	18.9	18.8	18.7	18.5	18.6	18.6	18.1
1913	18.6	18.7	18.4	17.7	16.3	15.6	15.9	15.8	15.8	15.5	15.6	16.1	16.4
1914	15.7	15.7	16.4	16.8	17.2	18.4	18.5	18.7	18.6	18.0	18.1	18.6	17.7
1915	18.6	20.2	22.8	22.7	22.0	23.7	24.2	23.8	23.3	22.7	22.7	23.3	22.8
1916	23.3	24.2	25.9	26.3	28.0	28.7	28.6	29.0	28.4	28.7	29.4	30.8	27.9
1917	31.8	32.7	36.7	38.8	43.7	49.8	54.3	54.8	54.2	55.5	55.9	58.2	47.8
1918	58.1	57.1	60.0	60.0	58.2	57.4	57.5	57.4	57.7	57.7	56.4	56.2	57.9
1919	55.2	51.1	51.3	47.9	48.0	50.5	51.8	52.2	51.3	50.6	51.0	51.6	50.3
1920	53.3	52.5	51.5	51.3	50.3	38.6	29.5	28.3	28.0	27.5	24.9	21.9	39.1
1921	19.6	19.8	18.9	17.9	16.0	15.4	15.5	15.4	15.5	15.8	15.6	16.9	16.4
1922	18.0	22.3	25.0	24.8	29.0	32.8	32.5	31.6	31.6	32.2	33.2	35.3	29.8
1923	35.3	35.3	37.3	39.2	41.7	41.5	38.3	37.0	37.1	36.9	36.4	36.2	38.9
1924	36.6	37.5	38.2	38.4	37.4	36.0	34.3	33.5	35.5	37.3	40.1	42.2	36.9
1925	42.8	43.2	43.0	40.8	36.9	35.7	39.4	38.1	37.8	37.2	37.8	39.5	38.5
1926	38.9	37.7	34.7	33.2	32.0	31.4	31.9	31.9	32.6	31.6	31.6	30.1	32.5
1927	30.9	31.1	31.3	30.4	30.1	30.2	30.7	30.7	31.2	30.9	31.1	32.0	30.7
1928	33.2	34.4	35.4	35.6	37.0	38.7	37.6	37.0	36.5	36.0	35.9	35.6	36.7
1929	35.9	35.9	35.5	33.8	31.3	30.2	29.4	29.2					

* The following weights were used: Jan. 4, Feb. 3, Mar. 3, Apr. 14, May 17, June 17, July 13, Aug. 6, Sept. 6, Oct. 7, Nov. 6, Dec. 4.

Sources of data: U. S. Dept. Agr. Monthly prices of wool. Crops and Markets 5 (7): 258. 1928. Current data from monthly issues of Crops and Markets.

Prices to Producers for Unwashed Wool, United States and California.—The Bureau of Agricultural Economics of the United States Department of Agriculture has attempted to obtain from producers information relative to prices received for unwashed wool. These data give a rough picture of wool price trends (fig. 40). The average producer, however, disposes of his product during one or two months of the year so that the data given in tables 75 and 76 would interest the producer in a general way.

Uniform price data for California wool are quite difficult to obtain on account of the wide variability in the product. In a discussion on California wool, Wilson states "The California clip as a whole is

variable. The great diversity in altitude, climatic conditions and soil types, makes the clip very uneven in grade, shrinkage and character. Parts of northern California produce some of the best wools grown in the United States. The fine wools of Humboldt and Mendocino counties compare favorably with the best Ohio fines. Much of the southern wool, however, is inclined to be short, harsh, heavy in dirt, and very seedy.'⁸⁰

TABLE 76

MONTHLY FARM PRICES OF WOOL (UNWASHED), CALIFORNIA, 1910-1929
(Cents per pound)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average*
1910	17				16	17	17	15	16	15	14	13	15.55
1911	12	12	12	11	12	14	12	14	11	12	11	10	11.92
1912	13	12	13	14	14	15	16	15	15	14	16	15	14.33
1913	14	12	18	15	13	14	16	18	11	11	12		14.00
1914		11	12	14	15	17	15	16	15	14	13	17	14.45
1915	15	16	18	19	18	22	21	21	17	17	16	17	18.08
1916	17	15	22	22	24	25	23	25	24	20	26	23	22.17
1917	24	31	38	38	46	50	53	55	47	53	48		43.91
1918	53	53			48	50	51	49	50	50	49	50	50.30
1919	44	40	42	37	44	47	49	47	45	41	40	46	43.50
1920		44	45	49	43	41	36		20	24	24	22	34.80
1921	15	12	12		10	10	11	11	13	13	11	14	12.00
1922	16	23	30	27	32	35	35	35	35	29	30	35	30.17
1923		38		38	46		36	30	32	35	30		35.63
1924	30	30		40	31	33	33	36	35	35	40	36	34.45
1925	41	43	44	44	40	37	40	40	37	35	34	39	39.50
1926	39	36	34	32	29	30	29	31	30	26	29	24	30.75
1927	28	30	31	28	27	27	26	29	31	25	28	29	28.25
1928	31	35	35	34	37	37	37	35	33	35	34	31	34.50
1929	35	32	33	30	30	28	27	28					

* Unweighted average.

Sources of data: 1910-1925, U. S. Dept. Agr. Prices of farm products received by producers. U. S. Dept. Agr. Statist., Bul. 17: 146. 1927. 1926-1929. Monthly issues of U. S. Dept. Agr. Crops and Markets. Current data from monthly issues of Crops and Markets.

The trend of wool prices in California has been similar to that in the United States (fig. 40), although the former have generally been lower than those for the nation. This was particularly noticeable during 1918 and 1919, although the proportional difference between prices showed but little change. During the slump in 1921 prices for this state went to lower levels than those for the nation. The former, as indicated in figure 40 show more variation than the latter owing to the more limited data. Prices in California recovered rapidly from the depression during 1921 and since that time have been maintained at fairly high levels. During the early part of 1929 there was a weakening of prices brought about by an increased crop at home and abroad.

⁸⁰ Wilson, J. F. Wool production in California. California Agr. Ext. Ser. Cir. 12:4. 1927 (Out of print.)

TABLE 77

AVERAGE AND RELATIVE PRICES OF CALIFORNIA WOOLS AT BOSTON, 1910-1928
(Scoured basis)

Year	Northern counties		Middle counties		Southern counties	
	Actual price, cents per lb.	Relative price* 1910-1914=100	Actual price, cents per lb.	Relative price* 1910-1914=100	Actual price, cents per lb.	Relative price* 1910-1914=100
1910	58	111	55	111	50	107
1911	50	95	47	95	45	97
1912	51	97	49	99	47	101
1913	50	95	47	95	45	97
1914	53	101	49	99	46	99
1915	64	122	60	121	56	120
1916	77	147	69	140	62	133
1917	149	284	130	263	113	242
1918*†	172	328	157	318	148	318
1919	157	300	145	294	134	288
1920	155	296	142	287	123	264
1921	75	143	68	138	54	116
1922	120	229	108	219	89	191
1923	133	254	120	243	104	223
1924	135	258	122	247	112	240
1925	134	256	121	245	112	240
1926	110	210	100	202	86	185
1927	103	197	95	192	76	163
1928	111	212	104	211	93	200

* Relative prices are based on the averages of the 1910-1914 prices for each wool considered.

† Six months only, January-June.

Sources of data: 1910, Nat. Assoc. Wool Manfrs. Quarterly report of Boston wool market. Quarterly Buls. 41: 178, 357, 495, 609. 1911. 1911-1928, U. S. Dept. Agr., Bur. Agr. Econ., Div. of Statis. and Hist. Res. Information to authors.

PRICES PAID TO PRODUCERS FOR WOOL AND COTTON, UNITED STATES, 1910-1928

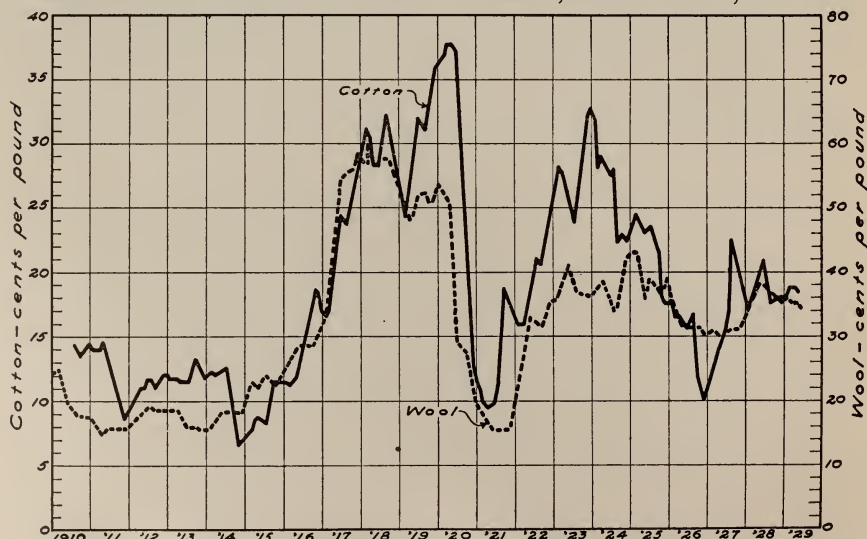


Fig. 38.—Cotton and wool prices move in the same general direction. Fluctuations in wool prices are apparently less violent than those in cotton, variations in wool production being less than those in cotton production. (Data from table 75 and from monthly prices paid to producers for cotton. The latter data are published monthly in U. S. Dept. Agr. Crops and Markets.)

INDEX OF WHOLESALE PRICES IN THE UNITED STATES, 1791-1925
(Pre-war prices = 100)

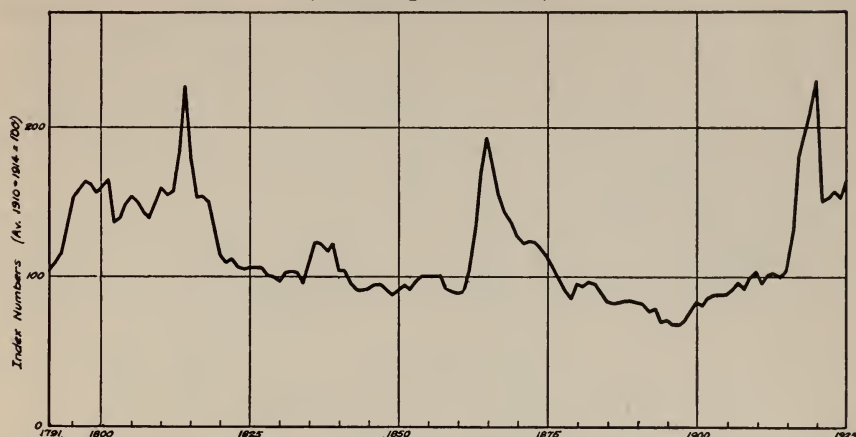


Fig. 39.—(From California Agr. Exp. Sta. Bulletin 435.) Source of data: Warren, G. F., and F. A. Pearson. The general price level. New York Agr. Exp. Sta. Farm Economics 2(45):697. 1927.

TABLE 78
PRICES PAID FOR WOOL, MENDOCINO COUNTY, CALIFORNIA
1899, 1905, 1907, 1909, 1913-1927
(Cents per pound)

Year	Long wool	Lamb's wool	Year	Long wool	Lamb's wool
1899	21.00	13.00	1918	66.00	40.00
1905	30.25	27.00	1919	64.00	32.00
1907	25.00	.....	1920	45.00	.....
1909	27.75	.....	1921	25.00	12.50
1913	22.00	11.00	1922	52.50	26.25
1914	24.75	15.00	1923	48.00	24.00
1915	29.13	18.00	1924	48.00	24.00
1916	34.00	20.00	1925	45.00*	45.00*
1917	63.00	30.00	1926	41.50	24.00
			1927	41.50	24.00
			1928	.....	.....

* Long wool and lamb's wool sold together. The prices are f.o.b. railroad shipping point. Table 78 has been incorporated into this publication at the request of W. P. Wing, Secretary of the Calif. Wool Growers' Assoc., who states that the wool clip for which prices are given is one of the best prepared in the state.

Source of data: Information from owner to Edwin C. Voorhies, 1929.

Considerable California wool has a poor reputation on both the Boston and Philadelphia markets and also in the mill trade. There are several reasons for this situation. Local wool has been poorly packed. Owing to our mild climate, there is a lack of rigid culling, the clip from old ewes becoming short and frowzy and making an undesirable product. The use of black-faced blood for the production of early lambs, and crossing back and forth indiscriminately has also been

harmful to better wool production as the wool clip lacks uniformity. On account of the demand for fat spring lambs, during recent years there has been a tendency to market the 'tops' in flocks. The sheepmen will then carry the 'tail enders.' In the fall difficulties have been encountered in replacing ewes in the flock, and the 'tail enders' on hand have been used for this purpose. This practice has been an important factor in the inferior quality of California wool.⁸¹

Boston Quotations on California Wool.—The reasons for the three quotations in table 77 are as follows: "The wide difference in the clips from various sections of California has led to the division of the state

TABLE 79
AVERAGE PRICES OF SHEEP-SKINS, SAN FRANCISCO, 1926-1929
(Dollars per pelt)

Year	Full wool			Spring lambs			Increasing to full wool					
	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1926	2.65	2.80	2.70	0.90	1.05	1.05	1.20	1.30	1.40	1.57½	1.77½	1.77½
1927	1.92½	2.20	2.45	0.90	1.20	1.20	1.35	1.50	1.60	1.60	1.85	2.07½
1928	2.55	2.75	3.00	1.00	1.20	1.55	1.65	1.85	1.60	1.60	1.70	1.95
1929	2.20	2.45	2.45	1.10	.90	1.00	1.10	1.10	1.25	.....	.....	.....

Source of data: Federal State Livestock Market News Service, San Francisco, Calif.

into three main areas, and wool from these is known on the market as northern counties, middle counties, and southern counties. The great variation in shrinkage in these sections has made it imperative to place market quotations on a scoured basis."⁸²

The quotations in table 77 are for California wool on a scoured basis at Boston. Although the individual sheepman can not compare these data with the prices which he has received, the former give more accurate information on wool price trends. Northern counties' wool commands a premium over that from either of the other sections, while that from the middle counties tops the southern counties' product in price (fig. 41).

Relative prices based on an average of quotations for the five-year period 1910-1914 have been listed in table 77 (see p. 148 for comments on base 1910-1914). These indicate that during and since the war quotations on wool from northern California were relatively higher

⁸¹ Interview with W. P. Wing, Secretary, Calif. Wool Growers Assoc., December 15, 1928.

⁸² Wilson, J. F. Wool production in California. Calif. Agr. Ext. Ser. Cir. 12:5, fig. 1. 1927. (Out of print.)

PRICES RECEIVED BY PRODUCERS FOR UNWASHED WOOL, UNITED STATES AND CALIFORNIA, 1910-1929

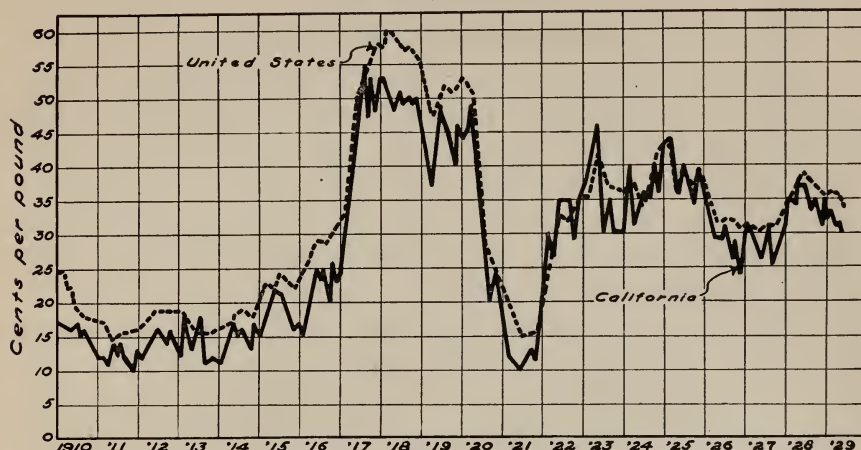


Fig. 40.—Prices for unwashed wool in California have followed those in the nation rather closely. During the years 1911-1914 prices were fairly steady. As a result of the War, prices began to rise gradually in 1915 and 1916, and precipitously after the entrance of the United States into the hostilities. The decline during the last seven months of 1920 and during 1921 brought prices to a lower level than had prevailed previous to the War. The recovery of wool prices was rapid in 1922, and since the latter part of that year they have been relatively high compared with general commodity prices. (Data from tables 75 and 76.)

PRICES OF CALIFORNIA WOOL ON THE SCOURED BASIS AT BOSTON, 1903-1928

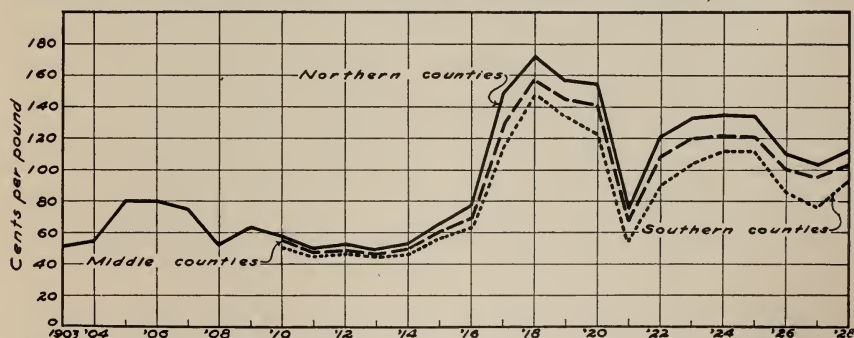


Fig. 41.—Except for the sharp decline in prices during 1921, quotations on northern, middle, and southern counties wool have held at fairly high levels. The margin between the better and poorer grades of wool widened in the post-war period. (Data from table 77.)

than those from middle and southern counties. Since the pre-war period the higher grade of this commodity has increased in value more rapidly than the lower grades. In common with prices for other grades in Europe and in this country prices declined during the fall of 1928 and the spring of 1929.

INTERNATIONAL TRADE IN WOOL

Imports and Exports, United States.—Increased supplies of needed wool have been furnished by imports. These have shown a decided increase over the past forty-one years. The area between the lines of trend in figures 34 and 35 give some indication of the necessity for these imports. Imports fluctuate from year to year, a year of small offerings from foreign countries usually being followed by one or two of large imports (tables 80 and 82).

During the past eighteen years there has not been a pronounced shift in the percentages of either clothing and combing or carpet wools imported, except that the war years brought about a noticeable increase in the imports of the first-mentioned class of wool. Following the war carpet wools again increased in the relative volume reported.

Since the United States is on an import basis, it is natural to expect that exports of domestic raw wool would be small. This has been the case for a number of years, although during certain years re-exports of foreign wool were considerable.

Practically all of the wool entering the United States is sent through the customs districts of the Middle Atlantic and New England States, little or none being sent via those of the Pacific Coast. Foreign wool is often unloaded at San Francisco, placed in bond, and usually shipped to Boston or Philadelphia. These imports are entered in the customs receipts of the Atlantic seaboard cities. In 1927 over 61 million pounds of wool were handled through Pacific Coast ports (San Francisco 53.5 per cent, Portland 38.1 per cent), most of this trade being represented by shipments billed for north and middle Atlantic ports. In figure 1 (p. 12) will be found the 'break' line for wool shipments by rail or water to the Atlantic Coast.⁸³

Origin of Imports.—Almost every section of the globe contributes to the imports of wool received by the United States (table 80). Since the war the principal sources of such imports have been Australasia (Australia and New Zealand), China, Argentina, the United Kingdom, and British India. Imports show a trend toward increased purchases in the primary markets rather than at the London sales. The proportion of wool imported from Great Britain in the last few years has been considerably below that of the pre-war average. The pro-

⁸³ Calculations on the 'break' line have been made by the American-Hawaiian Steamship Co. (J. R. Fitzgerald, agent), San Francisco, Calif.

TABLE 80

WOOL IMPORTED INTO THE UNITED STATES BY PRINCIPAL COUNTRIES OF ORIGIN AND
PERCENTAGE IMPORTS, 1913-1928†
(Thousands of pounds, i.e., 000 omitted)

Fiscal year	Oceania	China	Argentina	United Kingdom	British India	British South Africa	Turkey	Russia	All other countries	Total
1913	31,853	35,572	26,743	19,330	10,212	*	15,457	24,695	12,681	180,262
1914	64,698	31,078	42,277	22,024	14,150	*	10,358	22,845	14,141	236,081†
1915	75,866	36,718	77,808	16,447	2,120	*	4,730	2,290	40,982	273,558
1916	121,361	47,435	129,163	23,326	11,506	78,430	331	3,310	24,122	448,494
1917	1,772	30,471	207,970	2,575	450	31,970	10		37,288	350,108
1918	32,367	26,880	181,155	139	54	61,027		3,124	31,750	354,904
1919	93,033	40,243	139,452	2,039	4,920	57,566	129	1,583	42,244	422,415
1920	75,809	32,161	139,602	13,979	8,641	49,636	9,543	4,890	46,139	427,578
1921	68,880	26,012	104,023	16,264	536	25,933	3,339	1,026	36,036	318,236
1922	43,775	68,455	34,020	23,665	29,561	8,769	2,788	1,182	19,333	255,087
1923	141,868	67,360	96,977	45,635	28,739	27,124	11,154	4,306	53,667	525,473
1924	59,452	59,297	31,339	24,132	14,290	6,513	6,961	41	29,159	239,122
1925	62,739	58,101	34,781	24,713	29,247	6,184	5,078	527	42,505	284,706
1926	96,598	36,478	46,027	31,169	22,051	22,331	2,315	1,887	46,558	345,513
1927	58,455	37,513	28,812	33,696	25,612	6,535	8,401	2,634	51,422	270,905
1928	47,526	57,699	24,327	23,277	24,969	6,250	5,526	126	58,490	248,190

PER CENT OF TOTAL IMPORTS

1913	17.7	19.7	14.8	10.7	5.7	*	8.6	13.7	7.0	.....
1914	27.4	13.2	17.9	9.3	6.0	*	4.4	9.7	6.0	.....
1915	27.7	13.4	28.4	6.0	0.8	*	1.7	0.8	15.0	.....
1916	27.1	10.6	28.8	5.2	2.6	17.5	0.1	0.7	5.4	.....
1917	0.5	8.7	59.4	0.7	0.1	9.1	*	*	10.7	.....
1918	9.1	7.6	51.0	0.0	0.0	17.2	*	0.9	9.0	.....
1919	22.0	9.5	33.0	0.5	1.2	13.6	0.0	0.4	10.0	.....
1920	17.7	7.5	32.7	3.3	2.0	11.6	2.2	1.1	10.8	.....
1921	21.6	8.2	32.7	5.1	0.2	8.2	1.1	0.3	11.3	.....
1922	17.2	26.8	13.3	9.3	11.6	3.4	1.1	0.5	7.6	.....
1923	27.0	12.8	18.5	8.7	5.5	5.2	2.1	0.8	10.2	.....
1924	24.9	24.8	13.1	10.1	6.0	2.7	2.9	0.0	12.2	.....
1925	22.0	20.4	12.2	8.7	10.3	2.2	1.8	0.2	14.9	.....
1926	28.0	10.6	13.3	9.0	6.4	6.5	0.7	0.6	13.5	.....
1927	21.6	13.9	10.6	12.4	9.5	2.4	3.1	1.0	19.0	.....
1928	19.1	23.2	9.8	9.4	10.1	2.5	2.2	0.1	23.6	.....

* Included in all other countries.

† From 1914 on imports of mohair, alpaca, etc. are included. The above table is apt to be confusing to the reader if an analysis of the data is attempted. The gross imports are a mixture, not only of different wool classes but of the classes of wool in varying conditions. In the following table (81) the items followed by a cross (x) are included in the totals for 1927, 1928, and 1929. It will be noted that in these totals are included wool on the skin or in the grease, in the grease and washed, and scoured. These differences account for the seeming discrepancies between the above table and table 82 for the years 1913-1918. It is difficult to list imports so that the yearly data will be comparable.

Source of data: Nat. Assoc. of Wool Mnfrs. Wool imported into the United States. Ann. Wool Rev. 1928: 156. 1929.

TABLE 81

IMPORTS OF WOOL FOR THE FISCAL YEARS 1927-1929

(thousands of pounds, i.e., 000 omitted)

Class	1927	1928	1929
<i>Carpet</i>			
On skin or in grease { free.....	12,346 x	8,119 x	17,718 x
dutiable.....	85,659 x	95,952 x	103,721 x
Washed or scoured { free.....	7,642 x	5,083 x	5,058 x
dutiable.....	39,051 x	36,331 x	38,216 x
<i>Clothing</i>			
In the grease and washed:			
Actual weight.....	{ 16,268 x	{ 18,741 x	{ 17,291 x
Clean content—dutiable.....	{ 9,906	{ 10,837	{ 9,637
Scoured—dutiable.....	502 x	635 x	1,116 x
<i>Combing</i>			
In the grease and washed:			
Actual weight.....	{ 101,715 x	{ 78,783 x	{ 81,976 x
Clean content dutiable.....	{ 61,267	{ 47,725	{ 48,570
Scoured dutiable.....	1,193 x	1,499 x	1,502 x
Hair of the Angora goat, Alpaca, etc., and mohair:			
Actual weight.....	6,547 x	{ 2,204 x	{ 3,291 x
Clean content dutiable.....		{ 1,628	{ 2,371
Hair of the Cashmere goat:			
Actual weight.....	205 x	{ 686 x	{ 1,204 x
Clean content dutiable.....		{ 465	{ 828
Totals.....	271,128	248,033	271,093

x Included in totals.

TABLE 82

GROSS IMPORTS OF WOOL BY CLASS, UNITED STATES, 1913-1929

(Thousands of pounds, i.e., 000 omitted)

Fiscal years	Carpet, class III	Clothing, class I	Clothing,* class II	Total
1913	111,168	67,239	16,886	195,293
1914	102,003	125,089	20,557	247,649
1915	65,710	222,017	20,356	308,083
1916	109,269	403,122	22,437	534,828
1917	67,673	279,482	25,218	372,372
1918	58,995	303,869	16,266	379,130
1919	84,178	327,945	10,292	422,415
1920	72,226	337,212	18,140	427,578
1921	50,065	251,562	16,608	318,236
1922	148,787	32,821	73,479†	255,087
1923	171,879	43,703	309,890†	525,473
1924	118,375	12,820	107,927†	239,122
1925	138,461	24,446	121,800†	284,706
1926	118,080	16,663	210,771†	345,513
1927	144,699	16,777	109,428†	270,905
1928	145,485	19,376	83,152†	248,033
1929	164,712	18,407	87,974†	271,093

* Includes mohair, etc.

† This total includes wools not covered by the designation, class II wools, in the earlier tariff laws.

Sources of data: 1913-1927, Nat. Assoc. Wool Manfrs. Gross imports of wool, Ann. Wool Rev. 1927: 166 1928. 1928, 1929: U. S. Dept. Com. to authors.

portions of imports direct from Australia has been about double the pre-war percentage. There are decided differences in the types of wools exported to the United States from the different countries. Australia, Argentina, New Zealand, Uruguay, and the United Kingdom send the bulk of the combing wools, while China, British India, the United Kingdom, Palestine and Syria have been shipping the largest amounts of carpet wools. Clothing wool is shipped primarily by those countries sending combing wool.

Owing to changes in the designation of wools entering the country it is almost impossible to follow the present grouping with the exception of carpet wools over a long period of years.

Imports and Exports of Wool Manufactures.—In addition to the large imports of raw wool, considerable quantities are imported in various manufactured articles such as cloth, tops and yarns, wearing apparel, carpets, rugs, etc. The value of such imports in 1927 was \$62,396,620. The value of exports of manufactured material has amounted to approximately 10 per cent of the imports during the past five years.

The World Trade in Wool.—With the bulk of the wool produced in the more sparsely settled sections of the globe and utilized in the densely populated areas, there necessarily has developed a world-wide trade in this commodity. Over one-half of the world's present supply of wool is produced in the southern hemisphere. Approximately two-thirds of all the wool produced is sent to other countries from the nation in which it originates, there to be utilized in manufacture. The largest exporters of wool are Australia, Argentina, New Zealand, Union of South Africa, Uruguay, China and British India.

The largest amounts of wool are consumed in the highly industrialized nations of western Europe and the United States. Italy, Czecho-Slovakia, Poland, and Russia also purchase considerable quantities of this commodity. In the far east the industrialization of Japan has caused imports to rise at an almost phenomenal rate; imports for 1927 indicating an increase of 483 per cent over the pre-war average imports of wool. In the latter country this wool is not being imported entirely for consumption, but to a certain extent for manufacture and re-export. The notable failure of the United States and Europe to increase their demand for wool in proportion to the increase in supply would have resulted in considerably lower prices had it not been for radical changes in the habits of consumers in the Orient. The general adoption of western dress in Japan has enormously stimulated the consumption of wool.

TRENDS IN WOOL PRODUCTION (GRAND DIVISIONS AND COUNTRIES)

Opinions differ as to the probable future supply of wool and the world demand for it. On the demand side it is impossible to predict what the future of styles in clothing and in other woolen products will be. Scientific inventions will have some influence on the demand for wool in the future as in the past. It is reasonably certain that the wool supply of the world during recent years has not been increasing at the same relative rate as the population. This fact has caused comparatively high wool prices during the past few years (figs. 37 and 40). It would be impossible to state with surety whether or not these trends will continue.

In a discussion of world wool production during the latter part of the nineteenth century, T. Clyde McCarroll states:

“The opening up for settlement of vast areas of virgin land in the Western and Southern Hemispheres provided the basis for the great expansion in the wool-growing industry that characterized the latter half of the nineteenth century. In the thirty-five years between 1860 and 1895 world production of wool more than doubled. This phase of the industry’s growth came to an end in the early nineties with the occupation of the best lands, and the maximum number of sheep attained around 1891 has apparently never been surpassed.”⁸⁴

The larger part of the wool supply is still a product of what is called a ‘frontier industry.’ Owing to the encroachment of farming on the present frontiers the production of wool will be forced to compete with other agricultural industries. While it is undoubtedly true that there are sections in the world not now producing wool, which may eventually be devoted to it, such areas are not widespread. Generally speaking, if the demand for wool increases a considerable portion will necessarily have to come from both the present intensive and extensive margins of sheep production. Costs will be considerably greater than those now prevailing.

Much wool is produced under hazardous conditions. The weather very materially affects the number of sheep and the production of wool. A temporary variation in production may influence prices but will not materially affect the fundamental shifts in production. It seems probable that ultimately demand will increase faster than

⁸⁴ McCarroll, T. Clyde. The world’s wool production. National Bank of Commerce. Commerce Mo., March, 1928.

supply. One source of augmented output is an increased weight of fleece per sheep. With this object in view and present world prices it seems reasonable to expect that governments and wool growers will encourage more efficient breeding and care of sheep.

When studying future supplies the more important producing sections will be discussed separately. It is essential that sheepmen throughout the United States take cognizance of conditions prevailing in other parts of the world, not only as they affect the production of wool, but also in their relation to mutton and lamb.

TABLE 83

ESTIMATED NUMBER OF SHEEP AND ESTIMATED WOOL PRODUCTION, CANADA,
1915-1928

Year	Sheep and lambs, thousands	Wool production, thousand pounds	Year	Sheep and lambs, thousands	Wool production, thousand pounds
1915	2,039	12,000	1922	3,263	18,523
1916	2,023	12,000	1923	2,755	15,539
1917	2,369	12,000	1924	2,686	15,112
1918	3,053	20,000	1925	2,757	15,553
1919	3,422	20,000	1926	3,144	17,960
1920	3,721	24,000	1927	3,266	18,673
1921	3,676	21,251	1928	3,419	19,611

Sources of data: 1915-1925, Spencer, J. B. Sheep husbandry in Canada. Canada Dept. Agr. Bul. 75 (New Series): 103. 1926. 1926-1928, Information to authors from Dept. Agr., Ottawa, Canada.

North America.—While numbers of sheep are advancing in North America, pre-war levels have not yet been reached (tables 61 and 62).

Although the foreign trade of the *United States* in mutton and lamb is insignificant, that in wool occupies a prominent position. Trends of production and consumption of wool have already been discussed. It is probable that farming sections east of the Missouri River and in Texas could produce increased amounts of wool. During the eleven years 1918-1929 (January 1 estimates) the decrease in the combined numbers of horses and mules on farms in the United States was 6,952,000 head, or approximately 26 per cent. The greatest decline was evident in the eastern and central corn belt. From the standpoint of feed it is possible that this area could support larger numbers of sheep. The western range with improved methods of management could undoubtedly maintain a larger number of sheep. California might support greatly increased numbers should demand justify an extension of the industry. The relative profitableness of the cattle and sheep industries will undoubtedly have some influence

on the future. Entrepreneurs sometimes fail to recognize that sheep husbandry, similar to many other lines of endeavor, has its alternate periods of prosperity and depression.

One disturbing factor in connection with future supplies of wool in this country is the tariff. Both advocates and opponents of a wool tariff agree that a large part of the wool demanded in this country could be produced more cheaply abroad than here.

Another important factor in augmenting the supply of wool in the United States is the demand for lamb and mutton. A marked demand for meat would continue to increase the supply of wool. It has been estimated that an increase of 100,000,000 pounds of wool might be expected in the near future in the United States.⁸⁵ If this increase comes about the United States will be less dependent on foreign countries for wool for clothing needs. Any increase in wool production in the United States will be in a type of wool suitable for clothing manufacture. There is a possibility of increasing the average weight per fleece in the United States, and especially in California.

In any discussion of animal industries in the United States, *Canada* should be kept in view. Canadian sheep numbers undoubtedly run in cycles (table 83), as is the case in the United States. Since 1871 there has been no definite upward or downward trend in the number of Canadian sheep. Although the United States is the chief country to which Canada exports wool, there is little likelihood that this trade will ever become large. Indications point to an absorption of both the lamb and wool supply of Canada by domestic markets. It seems reasonable to expect a considerable increment in Canadian sheep numbers with the growth of the human population of Canada.

Conditions are favorable for sheep production in *Mexico*, especially on the plateau in central and northern Mexico. Owing to unsettled conditions, numbers dropped during the post-war period. Sheep numbers have increased appreciably during the last few years, but reports indicate that numbers are still below those of the pre-war period. There are twice as many goats as sheep in the republic.⁸⁶ Goats are raised in preference to sheep because they are easier to handle in the brush country where the thorns damage wool. Goat meat is used very extensively, and the hides are also utilized.

⁸⁵ McPherson, John Bruce. Increased world wool production. Mr. Stressinger's summarization. Nat. Assoc. Wool Manfrs. Bul. 58(3):347. 1928.

⁸⁶ Information received by the writer from the National Statistical Department of Mexico shows that in 1928 there were 5,423,959 goats and 2,697,668 sheep enumerated.

South America.—Data from South America are not sufficiently complete to make authentic statements relative to the sheep population possible. Indications are that the production of wool has fallen behind that of other continents during the past two decades. A considerable amount of this decline has come about through the reduction of sheep numbers in Argentina. With more careful attention to sheep husbandry—by improvement and selection rather than by expansion—the production of wool in both Peru and Bolivia might logically be increased. It is impossible to state with any degree of certainty whether sheep numbers in South America are at present equal to those of pre-war periods.

Argentina ranks second to Australia as an exporter of wool and is surpassed only by New Zealand in the export of lamb and mutton. A rapid development of sheep husbandry took place during the latter part of the nineteenth century, the peak being reached at about the turn.⁸⁷ Numbers decreased rapidly until 1913 (table 84). Some gains were made during the War but further losses occurred during the post-war slump. It is probable that no great increase in the sheep population will occur in the future. Production will be largely influenced by the same factor as in the United States, that is, by the future trend of prices for wool and mutton.

It is difficult to ascertain the volume of production of wool in Argentina. Wool shipments (table 86) might lead to the assumption that production had been kept at a high level. Unsold stocks of wool in 1920–21 and 1921–22 have been exported little by little, which makes it difficult to judge of production by the exports. Reliable estimates (table 85) place the annual production at approximately 325,000,000 pounds or over—almost equal to that of the United States. Consumption amounts to only 26,000,000 pounds, leaving an exportable balance of approximately 300,000,000 pounds. The larger part of the exports go to Germany, France, Great Britain, Belgium, and the United States. Exports to the latter country reached a high point in 1916–17 when 225,467 bales were shipped. There has been a gradual diminution in these exports, 30,120 bales being sent out in 1926–27.

Uruguay with its small human population and relatively large sheep population has a considerable amount of wool available for export. During the past fifteen years (table 87) there has not been a marked trend in these exports. Sheep population figures since the War are reported to be far lower than census returns for 1908. It

⁸⁷ Estabrook, Leon M. Agricultural survey of South America: Argentina and Paraguay. U. S. Dept. Agr. Bul. 1409:40. 1926.

TABLE 84

NUMBER OF SHEEP IN ARGENTINA, 1908-1928

(Thousands, i.e., 000 omitted)

Year	Number	Year	Number	Year	Number	Year	Number
1908*	67,384	1912	76,279	1916	44,855	1921	46,134
1909	65,082	1913	81,485	1917	45,309	1922*	36,209
1910	72,540	1914*	43,225	1919	45,767	1928†	38,000
1911	80,365	1915	43,677	1920	45,996	.....	.....

* Census.

† Estimate. Natl. Assoc. Wool Manfrs. Ann. Wool Rev. 1928: 215. 1929.

Source of data: U. S. Dept. Agr. Number of sheep. Foreign Crops and Markets 17 (3): 91. 1928.

TABLE 85

ESTIMATED PRODUCTION OF WOOL IN ARGENTINA AND URUGUAY

Average 1909-1913, Annual 1924-1928

(Thousand pounds, i.e., 000 omitted)

Year	Argentina	Uruguay
1909-1913	332,321	133,101
1924	316,000	97,000
1925	319,000	116,000
1926	363,000	129,000
1927	331,000	131,000
1928	343,000	139,000

Source of data: U. S. Dept. Agr., Bur. Agr. Econ. Wool, estimated production. Foreign Crops and Markets 18 (6): 182. 1929.

TABLE 86

ARGENTINE WOOL SHIPMENTS (IN BALES*), 1912-1928

Year	Number	Year	Number	Year	Number	Year	Number
1912-13	310,933	1916-17	349,622	1920-21	301,322	1924-25	257,625
1913-14	305,606	1917-18	288,051	1921-22	474,776	1925-26	342,699
1914-15	304,517	1918-19	273,392	1922-23	363,780	1926-27	351,199
1915-16	299,207	1919-20	305,524	1923-24	285,286	1927-28	322,067

* The average weight of the bale is about 420 kilos. A kilo equals 2.2046 pounds.

Source of data: Nat. Assoc. Wool Manfrs. Argentine Wool Shipments. Ann. Wool Rev. 1928: 213. 1929.

TABLE 87

URUGUAYAN EXPORTS OF WOOL (IN GREASE) AND PRICE PER KILO, 1913-1927

Year	Quantity, metric tons	Price per kilo	Year	Quantity, metric tons	Price per kilo	Year	Quantity, metric tons	Price per kilo
1913	68,440	\$0.47	1918	32,952	\$1.16	1923	42,723	\$0.49
1914	44,588	.50	1919	64,107	1.06	1924	43,585	.67
1915	37,904	.74	1920	31,746	.83	1925	39,516	.70
1916	30,602	.77	1921	55,359	.38	1926	51,511	.53
1917	39,352	1.07	1922	46,416	.34	1927	66,957	.48

Source of data: U. S. Dept. Com. Uruguay, tabular guide. Com. Rpts. 1928 (15): 64. 1928.

does not seem probable that there will be any appreciable increase in exports in the future, unless sheep husbandry becomes more profitable than cattle raising. Prices received for wool (table 87) during 1926 and 1927 were not satisfactory.

The sheep population of *Peru* has been estimated at 12 millions.⁸⁸ There are opportunities for a large increase in production, but this will come about probably by improvement in breeds rather than by an increase in numbers. The same situation exists in *Bolivia*, where the sheep population has been augmented since the War. Although some extensions in the industry may take place in regions more or less inaccessible at present, an enlarged wool production probably will come about by improvements within the industry.⁸⁹ Number of sheep in *Chile* have remained somewhat stationary during the past fifteen years. The southeastern section of *Brazil* has a sheep population of considerable magnitude but from meager data available indications point to a reduction since the pre-war period. Although at present the consideration of livestock in *Paraguay* must be confined chiefly to the cattle industry, available data show that increasing importance was attached to wool exports during 1921-1924.⁹⁰ With the exception of the western section of South America, on the plateaus and mountainous areas in Peru and Bolivia the sheep industry is of little importance north of the Tropic of Capricorn.

Australasia.—There was a slight decline in sheep numbers between 1909-1913 and 1921-1925, but during the four years 1925-1928 numbers were higher than before the war. Australasia now supplies approximately one-third of the entire world wool production.

The southern island continent of *Australia* is both the largest producer and the largest exporter of wool in the world. Although sheep numbers have been increasing during recent years (table 88), those recorded during the peak year of 1891 have never been exceeded. The most recent sheep returns for 1927 (Dec. 31) show considerable reduction compared with those for 1926. Rather severe and even more abrupt variations in sheep numbers brought about by drought conditions are not infrequent as may be seen by a study of table 85.

With reference to the future of Australian production, one student of the industry states: "It seems likely that wool production is still

⁸⁸ Unofficial estimate for 1927, U. S. Dept. Agr. The world situation in mutton and lamb. Foreign Crops and Market 17(3):87. 1927.

⁸⁹ Interview with David Weeks, Associate Agricultural Economist, University of California, Dec. 18, 1928.

⁹⁰ Estabrook, Leon M. Agricultural survey of South America. Argentina and Paraguay. U. S. Dept. Agr. Bul. 1409:87-88. 1927.

capable of expansion in response to favorable market conditions. The limiting factors appear to be drought and the depredations of pests rather than the encroachment of agriculture. The area under cultivation which has been doubling every twenty years since 1870, now stands at 17 million acres or less than 1 per cent of the total area, and has not greatly affected as yet the capacity of the country to produce wool. While much of the interior is essentially too hot for

TABLE 88

NUMBER OF SHEEP, AUSTRALIA AND NEW ZEALAND, 1900-1928
(Thousands, i.e., 000 omitted)

Year	Australia	New Zealand	Total	Year	Australia	New Zealand	Total
1900	70,603	19,355	89,958	1915	69,257	24,901	94,158
1901	72,040	20,233	92,273	1916	80,562	24,788	105,350
1902	53,668	20,343	74,011	1917	88,864	25,270	114,134
1903	56,933	18,955	75,888	1918	91,874	26,538	118,412
1904	65,824	18,281	84,105	1919	79,455	25,829	105,284
1905	74,541	19,131	93,672	1920	81,796	23,920	105,716
1906	83,688	20,108	103,796	1921	86,119	23,285	109,404
1907	87,650	20,984	108,634	1922	82,701	22,222	104,923
1908	87,043	22,449	109,492	1923	84,011	23,081	107,092
1909	91,676	23,481	115,157	1924	93,155	23,776	116,931
1910	92,047	24,270	116,317	1925	103,563	24,548	128,111
1911	93,004	23,996	117,000	1926	104,267	24,905	129,172
1912	83,254	23,750	107,004	1927	100,610	25,649	126,259
1913	85,057	24,192	109,246	1928		27,134	
1914	78,600	24,799	103,399				

Data for Australia for Dec. 31 of each year. In many compilations these data are used for the year following. See table. 00.

Source of data: U. S. Dept. Agr. Mutton and lamb. Foreign Crops and Markets 17 (3): 91. 1928.

sheep raising, sheep and particularly merino sheep, are, of all animals, best adapted to the peculiarities of the climate. Given water, they will subsist where cattle will starve when one of the frequent droughts shrivels up the vegetation. As the production of wool is not so adversely affected by sparse feeding as is the case in the meat industry, both cattle and sheep (other than the Merino sheep) have taken a subordinate place to Merino sheep husbandry.⁹¹

Data on the production of wool in Australia are given in table 89. The large fluctuations came about mainly on account of drought conditions. The 1928 production was the greatest in the present century. It seems probable, however, that it may decline somewhat during the

⁹¹ McCarroll, T. Clyde. The world's wool production. National Bank of Commerce. Commerce Mo., March, 1925.

next two or three years (see table 88). Predictions, however, are extremely hazardous to make. Although sheep numbers may decline, the health of the animal may improve, etc.

Prices obtained during and following the war were below normal. During the War stocks were moved with difficulty owing to insufficient shipping. Since the 1921-22 season prices have been far more satisfactory and should be sufficiently high to encourage production.

TABLE 89

WOOL PRODUCTION, AUSTRALIA AND NEW ZEALAND, 1913-1928
(Thousands of pounds, i.e., 000 omitted)

Year	Australia	New Zealand	Year	Australia	New Zealand
1913	632,297	194,628	1921	658,454	191,614
1914	569,775	197,267	1922	600,931	214,706
1915	463,750	181,283	1923	661,128	208,979
1916	547,972	193,830	1924	773,984	208,269
1917	641,771	209,841	1925	830,460	200,205
1918	652,920	227,521	1926	924,410	202,386
1919	547,058	204,965	1927	865,000	228,960
1920	536,542	181,480	1928	950,000	238,000

Sources of data: 1913-1914: Fairchild Textile Apparel Analysis. Wool production. Supplement to Fairchild Textile Apparel Analysis. 1927-1928: (7). 1928. Permission to publish material granted to authors, 1928. 1925-1928. U. S. Dept. Agr., Bur. Agr. Econ. Wool: estimated production. Foreign Crops and Markets 18 (6): 182. 1929.

TABLE 90

AUSTRALIAN WOOL SALES, 1913-1928
(Thousands of pounds, i.e., 000 omitted)

Year	Quantity	Year	Quantity	Year	Quantity
1913-14	639,770	1918-19	880,441	1923-24	710,577
1914-15	504,533	1919-20	852,022	1924-25	671,131
1915-16	580,235	1920-21	327,192	1925-26	997,187
1916-17	722,505	1921-22	881,554	1926-27	956,513
1917-18	824,612	1922-23	777,896	1927-28	920,067

Source of data: Nat. Assoc. Wool Manfrs. Australian sales. Ann. Wool Rev. 1928: 207. 1929.

Merino wools accounted for 69 per cent and crossbred wools for 31 per cent of the production during the 1926-27 season. Prior to the War there was a slow but steady gain in the production of crossbred wools relative to fine wools.

With a crop such as wool much may be stored pending a sufficiently heavy demand and except over a considerable period exports indicate but little. One change in Australian exports is noteworthy. During the past thirty years the exports to the United Kingdom have become

relatively less important while those to Europe (the Continent), Japan, and the United States have occupied a position of greater importance.

It is highly probable that sheep numbers in *New Zealand* (third in world's wool exports) have reached a saturation point. Sheep raising in this commonwealth must now compete with dairying and other more intensive agricultural enterprises. A peak in numbers was reached in 1918, followed by a decline which lasted until 1922 (table 88). Since the latter date there has been a steady increase, the number in 1928 being the largest number in history. Wool production for the fifteen years 1913–1928 is given in table 89. It will be noted that production in New Zealand fluctuates far less than in Australia.

Africa.—During the past few years Africa has made the greatest relative gains in wool production. Sheep are kept in comparatively large numbers in the northern section—Algeria, Morocco, and Tunis—and in the Union of South Africa. With the vast expanse of territory and varied natural conditions it seems probable that the wool output may be increased considerably, especially in the southern portion of the continent.

The most important wool-producing section of Africa lies in the south. In 1928 the *Union of South Africa* possessed 40,694,000 sheep (table 91), only a few less than the number in the United States in 1926 (table 4). Since 1908 there has been a somewhat irregular increase (table 91), culminating in a record number for 1928. A comparison between wool production and numbers of sheep indicates that the average wool production per sheep is somewhat low compared with that of the United States. Flockmasters in the Union are greatly interested not only in augmenting the wool clip but also in improving the quality of the wool produced.

There can be but little doubt as to the steady increase of wool production in the Union of South Africa. Indications point to a doubling of the pre-war production during the past few years (table 92).

Exports have gained steadily, the largest amount having been shipped to Great Britain. During the post-war period exports to the United States have been relatively small, although fluctuations are considerable.

Europe.—Production of wool in Europe diminished during and after the World War, but in 1927 it was back on a pre-war level. It is

TABLE 91
NUMBER OF SHEEP IN THE UNION OF SOUTH AFRICA, 1908-1928
(Thousands, i.e., 000 omitted)

Year	Number	Year	Number	Year	Number	Year	Number
1908	29,082	1913	35,808	1920	29,537	1925	35,570
1909	30,508	1915	31,434	1921	31,730	1926	38,849
1910	22,198	1916	31,981	1922	31,696	1927	40,109
1911	30,657	1918	29,914	1923	31,418	1928	40,694
1912	35,889	1919	31,739	1924	32,198	.....	.....

Source of data: U. S. Dept. Agr. The world situation in mutton and lamb. Crops and Markets 18 (6): 179. 1929.

TABLE 92
ESTIMATED WOOL PRODUCTION OF SOUTH AFRICA, 1907-1912, 1921-1928
(Thousands of pounds, i.e., 000 omitted)

Year	Production	Year	Production	Year	Production
1907	108,000	1912	157,000	1925	220,000
1908	101,000	1921	140,053	1926	245,573
1909	138,000	1922	177,426	1927	273,000
1910	125,000	1923	187,290	1928	285,000
1911	125,000	1924	185,200		

Sources of data: 1907-1912. Natl. Assoc. Wool Manfrs. Ann. Wool Revs. 1921-1923. Fairchild Textile Analysis. Wool production. Supplement to Fairchild Textile Apparel Analysis 1927-1928: (7). 1928. Permission to publish material granted authors. 1928. 1924-1928. U. S. Dept. Agr., Bur. Agr. Econ. Wool: estimated production. Foreign Crops and Markets 18 (6): 182. 1929.

TABLE 93
GREASE AND SCOURED WOOL EXPORTED FROM SOUTH AFRICA, 1913-1917, 1920-1927
(Thousands of pounds, i.e., 000 omitted)

Year	Grease wool	Scoured wool	Year	Grease wool	Scoured wool
1913	173,243	3,659	1922	198,570	11,215
1914	129,524	4,323	1923	155,053	9,045
1915	161,260	8,663	1924	162,738	7,761
1916	125,904	10,297	1925	200,669	7,948
1917	105,711	11,936	1926	205,654	6,041
1920	106,394	12,988	1927	253,866	6,468
1921	218,894	11,527			

Source of data: Natl. Assoc. Wool Manfrs. Ann. Wool Rev.

now relatively lower, compared with world production than before the war. Indications point to a considerable increment in wool production, as sheep numbers have increased appreciably during the past three years. Russia, Spain, England and Wales have especially displayed a tendency to an upward swing. It is highly probable that no marked future expansion will occur in any of the European countries

with the exception of Russia. A decided amelioration of post-war unsettlement in business and politics is already in sight and this should stimulate Europe's wool consumption.

It is difficult to obtain accurate data on wool production in *Russia*. During the World War and later during the Civil War (in *Russia*), sheep husbandry suffered a severe set-back. In 1928 numbers were evidently higher than they were in the pre-war period. Wool production in 1928 is estimated at 350,000,000 pounds, an amount almost equal to that produced in the United States. This represents an increase of 6 per cent over 1927 and 6 per cent over 1916. Since the pre-war period there has been a sharp decrease in the commercial

TABLE 94

SHEEP NUMBERS AND WOOL PRODUCTION, UNITED KINGDOM, 1913-1928

Year	Sheep	Wool	Year	Sheep	Wool
	<i>thousands</i>	<i>thousands of pounds</i>		<i>thousands</i>	<i>thousands of pounds</i>
1913	27,629	125,122	1921	24,273	101,100
1914	27,964	121,200	1922	23,761	102,900
1915	28,276	122,475	1923	24,155	101,965
1916	28,850	124,408	1924	25,042	104,668
1917	27,867	125,176	1925	26,474	109,853
1918	27,063	119,736	1926	27,684	114,567
1919	25,119	115,659	1927	28,419	118,537
1920	23,404	104,821	1928	27,873	119,690

Sources of data: Sheep numbers. U. S. Dept. Agr. The world situation in mutton and lamb. Crops and Markets **17** (3): 91. 1928. Wool production: Natl. Assoc. Wool Manfrs. Sheep and wool production in Great Britain and Ireland. Ann. Wool Rev. **1928**: 190. 1929.

supply of wool. Efforts have been made during the past few years by representatives of the Soviet Union to foster sheep husbandry. Several thousand sheep were recently imported from the United States for the purpose of improving Russian flocks. Before the War the Russian output was insufficient to supply the home market. Russia bears watching. With a large population a favorable change in economic conditions should greatly stimulate wool consumption. Although there are opportunities for a greatly expanded sheep industry especially in Asiatic Russia,⁹² it is highly improbable that Russian products will ever be found on the world markets.

The Mediterranean basin has an exceptionally dense sheep population, although political boundaries often make that of individual states appear relatively small. From the standpoint of sheep numbers, *Spain* ranks high, although Spanish wool occupies an insignificant place in

⁹² Tschajanoff, A. W. Die Landwirtschaft des Sowjetbundes. 40 p. 55 fig. Paul Parey, Berlin. 1926.

world trade. Present numbers (1928) indicate an increase of approximately 25 per cent compared with the pre-war years 1909-1913. *France* suffered from serious depletions in flock numbers during the war, and since that time only a slight increase has occurred. Compared with pre-war years, numbers of sheep in *Italy* have shown a tendency to increase during recent years. During the World War flocks in the Balkan area were seriously depleted but since 1920 these have shown a tendency to return to the pre-war level, except in *Jugoslavia*.

During recent years there has been a decline in the wool production of northern and western Europe. Sheep and wool production in the *United Kingdom* are still below pre-war levels although present trends point upward (table 94). No pronounced expansion in the industry can be expected.

Asia.—*Russia in Asia, China, British India and Turkey* are the largest producers of wool in Asia. With the exception of the last-named country, sheep and wool production are apparently back to pre-war levels. Although the production of Asia constitutes less than 10 per cent of the entire world output, exports—especially carpet wools—are high. Undoubtedly there are possibilities of expansion especially in Asiatic Russia but it is not probable that any considerable advance in sheep numbers will occur in other parts of Asia.

THE TARIFF

The tariff as related to sheep, lambs, and wool which has been in effect since 1922 is as follows:

Par. 701.—Tallow $\frac{1}{2}$ cent per pound.

Par. 702.—Sheep and goats, \$2 per head; fresh mutton and goat meat, $2\frac{1}{2}$ cents per pound; fresh lamb, 4 cents per pound.

Par. 1101.—Wools, not improved by the admixture of Merino or English blood, such as Donsoi, Native Smyrna, Native South American, Cordova, Valparaiso, and other wools of like character or description, and hair of the camel in the grease, 12 cents per lb.; washed, 18 cents per lb.; scoured, 24 cents per lb. The duty on such wools imported on the skin shall be 11 cents per lb.; provided that such wools may be imported under bond in an amount to be fixed by the Secretary of the Treasury and under such regulations as he shall prescribe; and if within 3 years from the date of importation or withdrawal from bonded warehouse satisfactory proof is furnished that the wools have been used in the manufacture of rugs, carpets, or any other floor coverings, the duties shall be remitted or refunded; provided further, that if any such wools imported under bond as above prescribed are used in the manufacture of articles other than rugs, carpets, or any other floor coverings, there shall be levied, collected, and paid on any wools so used in violation of the bond, in addition to the regular duties provided by this paragraph, 20 cents per lb., which shall not be remitted or refunded on exportation of the articles or for any other reason. Wools in the grease shall be considered such as shall have been shorn from the sheep without any cleansing; that is, in their natural condition. Washed wools shall be considered such as have been washed with water only on the sheep's back, or on the skin.

Par. 1102.—Wools, not specially provided for, and hair of the Angora goat, Cashmere goat, Alpaca, and other like animals, imported in the grease or washed, 31 cents per lb. of clean content; imported in the scoured state, 31 cents per lb.; imported on the skin, 30 cents per lb. of clean content.

Par. 1103.—If any bale or package containing wools, hairs, wool wastes, or wool waste material, subject to different rates of duty, be entered at any rate or rates lower than applicable, the highest rate applicable to any part shall apply to the entire contents of such bale or package.

- Par. 1106.—Wool, and hair of the kinds provided for in this schedule, which has been advanced in any manner or by any process of manufacture beyond the washed or scoured condition, including tops, but not further advanced than roving, 33 cents per lb. and 20 per cent ad valorem.

FREE LIST

- Par. 1655.—Sausage casings, wesands, intestines, bladders, tendons, and integuments not specially provided for.
- Par. 1666.—Skins of all kinds, raw, and hides not specially provided for.

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